PREPARING EFFECTIVE TEACHERS OF ENGLISH LEARNERS:
A REPORT OF COHORT TWO FINDINGS FOR MATHEMATICS ACHIEVEMENT
WITH TEACHERS OF HIGH-NEED URBAN POPULATIONS (MATH-UP)

TECHNICAL REPORT No. 1

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November 1, 2014

The Math Up Project was funded by the United States Department of Education through the Teacher Quality Partnership Grants Program Recovery Act. The grant was awarded to Lehman College of the City University of New York, Bronx, NY
Executive Summary

The increase in the numbers of school age English learners (ELs)\(^1\) in all types of communities across the U.S. (NCES, 2008; NCES, 2010) has led teacher educators to explore ways to prepare all teachers to provide ELs with the opportunities they need to achieve academically. This report describes the first stages of an investigation of the impact of a clinically rich preservice program that prepares elementary teachers to be effective teachers of ELs.

The research is part of a longitudinal study following five cohorts of elementary educators through their preservice programs and first two years of teaching. Three cohorts are being prepared in a preservice program called the Mathematics Achievement with Teachers of High-need Urban Populations (MATH-UP), a federally and state funded residency project focusing on improving the ability of elementary teachers to be effective teachers of mathematics and of children in high needs urban schools where there are large numbers of ELs. Two additional cohorts are completing a traditional graduate teacher education program and serve as comparison groups.

The research questions guiding this longitudinal study are:

1. How does the Math Up Program prepare candidates to teach emergent bilingual learners/ (EBLs) or English learners (ELs)?
   1.1. What are the elements of /choices in curricular and pedagogical content, plan of study, preparation and selection of instructors, field experiences in the Math Up Program that focus specifically on teaching EBLs/ELs?
2. How effectively does the Math Up Program prepare candidates to be effective teachers of emergent bilingual learners (EBLs) and English learners (ELs)?
3. How does Math Up preparation compare to the preparation that candidates receive in a traditional preservice program?
   3.1. What are the elements of /choices in curricular and pedagogical content, plan of study, preparation and selection of instructors, and field experiences in the traditional program that specifically prepare candidates to be effective teachers of EBLs/ELs?
   3.2. What are the similarities between Math Up and a traditional program? What are the differences?
4. How does the effectiveness of the Math Up preparation compare to the preparation of candidates who completed a traditional preservice program?
   4.1. What, if any, are the differences in the theories of practice of graduates of the regular programs and graduates of the Math Up program at the end of their preservice program in relation to teaching EBLs and ELs during the first year of teaching?
   4.2. Are there differences between the student learning data of graduates of Math Up and graduates of the traditional programs?

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\(^1\) The author has chosen to refer to linguistically diverse learners as English Learners (ELs) because the study focuses on the English instruction of elementary educators in both English medium and bilingual elementary classrooms.
A mixed method, triangulation design is used for this longitudinal study. Using a data transformation model (Crestwell & Clark, 2007), quantitative and qualitative data were collected and coded separately. Qualitative data were coded using research based core teaching practices. To identify core practices that are effective with ELs, an extensive review of existing research was undertaken. Sources included: studies of specific practices, large scale reviews of research, and research-based models of instruction for ELs. Quantitative data included pre- and post-program attitude surveys, number of ELs in internship and first year classrooms, and demographic data on program participants. Results of student English proficiency data from the classrooms of graduates of the first cohort of Math Up graduates was used to create a baseline for the future data collection of the cohorts under investigation.

The review identified a strand of core practices composed of instructional routines and methods that included providing ELs access to grade/age appropriate content standards and to the language demands relevant to the content; building ELs’ background knowledge in the content, providing ELs with comprehensible input, using verbal scaffolding to help ELs access academic language and content; structuring meaningful practice that incorporated opportunities for language skills development and grouping structures that promoted interaction among ELs and English proficient peers; using linguistically responsive assessment to gather evidence of learning and providing corrective feedback, tapping learners full linguistic repertoires (i.e., capitalizing on native language knowledge & translanguaging); and incorporating culturally responsive curriculum & pedagogy. These were used to analyze preservice artifacts (e.g., work samples from candidates’ electronic portfolios and supervisors’ observation records), and to analyze observations of lessons in the first two years of teaching.

Summary of Findings & Discussion

The Intended Preservice Curriculum

The Math Up program demonstrates a commitment to preparing all candidates for teaching ELs by: (1) requiring all candidates to complete specific coursework focused on teaching ELs, (2) providing field experiences in classrooms with ELs, (3) building knowledge of teaching ELs into candidate evaluation, and (4) offering all candidates and graduates webinars specifically focused on differentiating instruction for ELs.

Fifty percent of the 12 courses taken by all candidates in the Math Up Program contained course descriptions and/or goals that specifically included language about teaching linguistically diverse students (N=6). Despite the explicit attention to linguistic diversity in goals for half of the courses in the program, at the level of course topics, readings, and assignments, the number of specific references to linguistic diversity fell to 27% (N=3). Only one course requiring fieldwork specifically related to working with linguistically diverse learners, though all candidates visited classrooms with ELs as part of the school inter-visitation requirements for the Math Up program.

Preparation for teaching ELs was “front loaded” in the form of two back-to-back courses in the summer prior to the beginning of the yearlong internship. These courses were designed to provide candidates with a knowledge base for teaching ELs. The first course exposed all candidates to ELs by requiring the completion of a field-based case study of an English learner/emergent bilingual learner. In the second course, candidates had to use what they learned
from the case studies to plan for instruction using sheltered instructional strategies aligned with
core practices identified in the literature on second language learning and teaching.

Candidates were exposed to core teaching practices through the sheltered instruction
observation protocol or SIOP (Echevarria, Voyt, and Short, 2010) in an ESL methods course. As
a result, some routines associated with core practice in the research literature such as
frontloading, structuring protracted language events, and using corrective feedback did not
receive the same emphasis in the course as routines emphasized in the SIOP such as planning for
and sharing language objectives with learners during instruction.

The program handbook identified work with ELs as part of the program’s fieldwork, and all
but one of the participants completed yearlong internships in classrooms where there was at least
one EL, even though placement in a classroom with ELs was only a requirement for those
candidates seeking a bilingual extension.

Evaluating How Candidates Experience Their Preparation

The evaluation of candidates’ preparedness to teach ELLs were found in artifacts of their
learning from their coursework and fieldwork. There are two key assignments that all candidates
include in their portfolios in the summer prior to beginning their internship to demonstrate their
ability to teach ELs, a case study of an EL/EFL and a reflection describing connections between
a set of sheltered lesson plans and knowledge of the EL/EFL in the case study. All participants
in Cohorts 2 and 3 received either a satisfactory or exemplary score for both of these
assignments, suggesting that they were developing the skills to identify the linguistic needs of an
EL/EFL and plan for instruction based on this knowledge.

Even though there were multiple ways that the intended curriculum focused candidate’s
attention on the needs of ELs, the lack of a requirement that interns be placed in classrooms with
ELs resulted in some candidates having limited opportunities to teach ELs during their
preservice program. If the candidates seeking a bilingual extension and who are required to
complete the internship in a classroom of bilingual children are removed from the total number
of candidates in Cohorts 2 and 3, then of the 17 candidates preparing to teach in English medium
classrooms, close to a third (29.4%) did not teach ELs in their internship classrooms. One of the
questions this raised is whether this difference matters in terms of core teaching practices. That
is, do these differences in how preparation was experienced correlate to the kinds or frequency of
core practices produced during the preservice experience and the kinds of practices observed in
the first years of teaching. The analyses of data regarding the potential impact of the number of
ELs in the internship on teaching practices during the preservice program may become apparent
once the preservice artifacts, i.e., portfolios and supervisors’ evidence collection records, of all
Cohort 2 and Cohort 3 candidates are analyzed. The analysis of the relationship between the
number of ELs in the internship and teaching practices observed in the first year lessons is based
on a limited amount of data, but is a worthy question to pursue as the database grows.

In the findings section, a case study of a candidate is presented to demonstrate how effective
practices for teaching ELs is supported in planning and instruction during the preservice
experience. All of the core practices under investigation were found either in portfolio lesson
plans, reflections, videos of teaching, or in the observation notes of supervisors. This is perhaps
not surprising given that many of the practices identified as effective for ELs are, in fact, good
practices for struggling learners in general. However, some practices were more evident than
others in the preservice artifacts. There are two possible explanations for this. One is that the
majority of the artifacts were lesson plans. Documentation of actual instruction is significantly less prevalent in the portfolios and so some practices such as verbal scaffolding did not appear in lesson plans, but were evident in the less prevalent form of evidence such as videos. A second explanation is that while preparation for all of the core practices is evident in the intended curriculum, it is also evidenced that some practices may have been emphasized more than others. For example, the kinds of evidence found in portfolio artifacts for promoting student-to-student interaction suggest that the candidates were not prepared to teach English proficient children to assist ELs during group activities.

Evidence of Core Teaching Practices in First Year Lessons

The content analysis of observations of the lessons of 11 graduates in their first year of teaching suggest that all of the core practices under investigation were evident in the teaching of the first year teachers. The most prevalent were providing comprehensible input, exposing all children regardless of language proficiency level to grade level content and academic vocabulary, and verbal scaffolding. In the case study example provided in the full report that follows, there is evidence that certain practices, verbal scaffolding in this case, are prominent in the first year lesson even though they did not occur with great frequency in preservice artifacts. This raises the question about the challenge of using frequencies to ascertain emphasis when using different kinds of data.

The findings also reveal that some approaches to using a core practice in ways recommended in the literature are missing from the practices observed in first year classrooms. These approaches included: (1) opportunities in the English medium classrooms for children to use all of their language knowledge including what they know in their native language, (2) the use of corrective feedback by the teacher, and (3) attention to guiding English proficient students in how they can assist their non-English speaking peers in grouping. It also appears that teachers emphasized learning academic vocabulary as important, but attention to the syntactic and discourse challenges of academic language seemed to have been rarely attended to in any explicit way, which raises a question as to whether these kinds of language demands was adequately addressed in coursework. Perhaps some practices commonly identified as good teaching in general differ in important ways from best practices for ELs, which emphasize supporting language development. The question is whether it makes a difference that program graduates emphasized some routines and core practices while ignoring others, i.e., will this impact their ability to improve ELs’ success rates on tests of language proficiency or academic learning?

Influence of Personal and Contextual Factors on Teaching Practices

The investigation included an analysis of possible relationships between personal and contextual factors that might be related to the number of effective practices observed in the first year lessons. It does not appear from cohorts 2 and 3 data that candidates’ attitudes about how influential language proficiency is on student learning and behavior changed from the beginning to the end of the program, not did their attitudes significantly influence the number of core teaching practices observed in the first year of teacher. Third, more core teaching practices were found in PreK-Grade 2 classrooms than in the classrooms of grades three and above, suggesting that as the N becomes larger in future data collection, a significant difference might emerge, with lower grade classrooms containing higher numbers of best practices than higher grades. This
finding is important given that the academic language and content demands of upper grades are greater than in the early grades. ELs in upper grades need more support, not less, to comprehend and communicate more complex levels of academic content and language. In the next stage of research, a content analysis needs to be undertaken of differences in practices at the two levels to inform recommendations about how to maximize the application of best practices in the upper grades.

Future Directions for the Research

The report closes with a summary of the investigation that will be undertaken in the next stage of the study. In addition, a description of the data being collected on traditional candidate cohorts is provided as is a summary of state and local policy changes that may affect the longitudinal data to be collected over the next few years.
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Introduction

The argument that all teachers need to be prepared to teach linguistically diverse learners is supported by a significant body of evidence. Linguistically diverse learners include English learners (ELs), who are learning in classrooms where English is the language of instruction or who are learning through two languages in bilingual programs. School districts across the country are serving ELs; no longer are immigrant families only concentrated in cities. In fact, rural communities have witnessed a significant increase in immigrant families (NCES, 2010). Statistically, 21% of school age children speak a language other than English at home and a quarter of these have difficulty speaking English according to a parent survey (NCES, 2010). In the 100 largest school districts in the US cities, 94% reported that they had English learners and in some districts in California, English learners constitute 55% of the student population (NCES, 2008). So pervasive is the challenge of meeting the academic needs of linguistically diverse learners that one would be hard pressed to find any recent major educational policies that do not include the academic achievement of these learners as a criterion for school and teacher effectiveness.

Given the ubiquity of linguistically diverse learners in public schools, it should be evident that all teachers must be prepared to educate ELs; however, as recently as 2008-2009, only three states required all prospective teachers to demonstrate competence in teaching ELs (State Education Reforms, 2009). In a recent national Title III report (USDOE, 2012), states and districts reported that a lack of expertise among mainstream teachers and adequate accountability for teaching ELs in the current teacher evaluation structures presented significant challenges for them.

Teacher educators recognize the importance of preparing teachers to meet the needs of ELs (Garica, Arias, Murri, & Serna, 2011) and models of teacher preparation to accomplish this have begun to emerge (Brisk, 2008; Levine, Howard & Moss, 2014). One of the common threads in what has been learned from these efforts is the importance of intentionally providing opportunities for candidates to develop practices that promote ELs’ academic success in coursework and clinical, field based work with learners and teachers. The research project reported here investigates the impact of a clinically rich program that includes preparation in core teaching practices leading to the academic success of English learners. This longitudinal study follows five cohorts of teacher education program graduates through their preservice programs and their first two years of teaching. Three of the cohorts were prepared in a preservice program called the Mathematics Achievement with Teachers of High-need Urban Populations (MATH-UP), a federally and state funded residency project focusing on improving the ability of elementary teachers to be effective teachers of all subjects, particularly mathematics, and high

2 The author has chosen to use the term English Learners (EL) for this report because the study focuses on the English instruction of both English medium and bilingual elementary educators. The author chose not to use the term English Language Learner (ELL), the term identified in Title III because she wishes to emphasize that these learners are not just learning the English language, but are also learning important content through the language of English. Another term that has been introduced in recent scholarship is Emergent Bilingual, which communicates that a child with a native language other than English is moving toward bilingualism when developing the ability to learn through English in school (Garcia, et. al., 2009) and both terms appear in the research questions.
needs, low-performing Bronx schools that partnered in the project. Two additional cohorts are candidates who completed a traditional graduate program in Childhood Education at the same institution of higher education.

This technical report offers findings for the first two questions using data collected on participants in cohorts 2 and 3, and in one case, data from cohort 4.

**Research Questions**

1. How does the Math Up Program prepare candidates to teach emergent bilingual learners (EBLs) or English learners (ELs)?
   1.1 What are the elements of choices in curricular and pedagogical content, plan of study, preparation and selection of instructors, field experiences in the Math Up Program that focus specifically on teaching EBLs/ELs?

2. How effectively does the Math Up Program prepare candidates to be effective teachers of emergent bilingual learners (EBLs) and English learners (ELs)?

3. How does Math Up preparation compare to the preparation that candidates receive in a traditional preservice program?
   3.1. What are the elements of choices in curricular and pedagogical content, plan of study, preparation and selection of instructors, and field experiences in the traditional program that specifically prepare candidates to be effective teachers of EBLs/ELs?
   3.2 What are the similarities between Math Up and a traditional program? What are the differences?

4. How does the effectiveness of the Math Up preparation compare to the preparation of candidates who completed a traditional preservice program?
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   4.2 Are there differences between the student learning data of graduates of Math Up and graduates of the traditional programs?

**Significance of the Study**

The findings reported in this technical report are part of a longitudinal study of the effects of preparing teachers with a set of core teaching practices leading to the academic success of English learners. The importance of preparing all teachers to work with ELs is evidenced in national, state and local policies and agreements that hold teachers and schools accountable for ELs’ academic success. The study is designed to document evidence of core teaching practices that ensure ELs academic success in artifacts of preservice learning (e.g., portfolios, internship evaluations) and observations of practice during the first two years of teaching, and evidence of ELs’ success in the classrooms of program graduates. The investigation of core practices is also tied to an investigation of attitudes toward teaching ELs because there is evidence that teacher efficacy correlates with attitudes towards learners with diverse learning needs and that preservice preparation can influence attitudes (Gao and Major, 2011).
Meaningful evaluation of teacher preparation can only be achieved by the study of what candidates are able to accomplish with learners once they become classroom teachers. The findings from this investigation will inform preservice program design by demonstrating whether the explicit inclusion of core practices focusing on teaching ELs will prepare teachers for their first years of teaching in classrooms where most will be working with ELs. It builds upon the body of literature describing the knowledge, skills, and dispositions that teachers need to help ELs achieve academically (e.g., Casteel & Ballantyne, 2010, deJong, 2012; Samson & Collins, 2012). Procedures piloted in this study can serve as a tool for: (1) evaluating the content of the intended teacher education program curriculum (e.g., course outlines, text choices, assignment descriptions, etc.) and the curriculum as experienced by candidates; and (2) providing insights into core practices for teaching English learners (ELs) that impact learning.

Theoretical Framework

Identifying a pedagogy for teacher preparation that is sufficiently rigorous to inform teacher education policy has emerged in recent years as an important focus of educational research (Cochran-Smith & Zeichner, 2005; Sleeter, 2014). Based on a recent review of studies of teacher education, Sleeter (2014) argues that existing research offers very limited evidence that can inform teacher education policy. She suggests that much of the research is narrowly focused, fragmented, and/or does not connect teacher education with impact on teaching practice and student learning.

The current investigation supports an emerging view among teacher educators and researchers that teaching practice must be the focus of teacher preparation and that a core set of teaching practices can and must be identified and shared with teacher candidates and teachers to successfully educate all learners (Core Practice Consortium, 2014, April; Heibert & Morris, 2012; McDonald, Kasemi, & Schneider Kavanagh, 2013; Zeichner, 2012). Hiebert & Morris (2012) refer to these practices as general pedagogical practices or instructional routines. Zeichner (2012) suggests that current efforts to identify core practices of good teaching can be divided into strands, one which focuses on practices embedded in the teaching of core subjects and the other in practices that can be used across subjects and grade levels. In the current study, a third strand has been identified that overlays the two described by Zeichner, and this is the strand that focuses on effective instruction for particular populations of learners. It is important to point out that identifying core teaching practices through the lens of particular populations of learners, English learners in this case, is not intended to ignore that core practices should serve all students. However, as will be discussed later in the review of literature, a focus on generic core practices can miss important practices that, although effective for all learners, are essential to the success of English learners in the various contexts (English medium or bilingual classrooms) in which they are educated.

Identifying Core Teaching Practices for Teaching English Learners: A Review of the Literature

Teachers can effectively advocate for ELs through the teaching and curricular choices they make in the classroom, and the work they do beyond the classroom with colleagues, families and communities (Dubetz & deJong, 2011). It current study focuses on the work that teachers do in the classroom to ensure the success of ELs, and is grounded in the theory that
there are core effective practices that can be identified and applied across different contexts to ensure student learning, and that preservice candidates can learn to use these practices in clinically rich preservice programs. McDonald and colleagues (2013) have identified a preliminary set of criteria for identifying core teaching practices. They are:

- Practices that occur with high frequency in teaching
- Practices that novices can enact in classrooms across different curricula or instructional approaches
- Practices that novices can actually begin to master
- Practices that allow novices to learn more about students and about teaching
- Practices that preserve the integrity and complexity of teaching, and
- Practices that are research-based and have the potential to improve student achievement.

(p. 380)

These criteria were used to select the strand of core practices for teaching ELs. The purpose for investigating core practices for teaching ELs was not to separate the important kinds of core teaching practices being identified by researchers and educators as generally effective across classroom contexts or within specific disciplines (e.g., The Core Practices Consortium, 2014; Danielson, 2007) from practices that have been identified as particularly effective with ELs, but to ensure that any set of core practices incorporate approaches to instruction that are particularly effective for ELs. Preparing teachers to use practices specific to teaching ELs is critical given that most will teach ELs at some point in their careers regardless of whether they are teaching in urban or rural schools due to the shifting demographics described earlier in the report. Furthermore, scholars in the fields of bilingual education and second language teaching and learning have argued that “just good teaching” does not fully address the cultural and linguistic demands necessary to help ELs succeed (DeJong and Harper, 2005; Dolson & Burnham-Massey, 2011; Palmer & Martinez, 2013; Yoon, 2007). To identify a strand of core practices that are effective in providing ELs with access to grade level content, a review was undertaken of studies of specific practices for teaching ELs, large-scale reviews of research, and research-based models of instruction for ELs.

Although it may seem intuitive for teachers to simplify content or lower academic standards for learners who speak little or no English in order to allow them time to develop second language proficiency, research has shown that ELs are best supported in their academic and linguistic development when held to high academic standards. (Faulkner et al, 2012; Ballantyne, 2008). All learners including ELs fare better academically when exposed to tasks and assignments that are grade and age appropriate. Therefore, instruction for ELs must be aligned with grade and age appropriate content and academic standards. This poses a challenge to classroom teachers because limited proficiency in the language of instruction can limit learners’ access to content. Teachers must use core practices that will ensure that ELs will not only be exposed to grade level content, but be able to engage with the content. Core practices that enhance second language acquisition and learning, and ensure ELs’ engagement in content learning are:

- Helping English learners develop proficiency in academic language,
- Using learner resources to support new learning (connecting new learning to existing background knowledge, capitalizing on ELs’ full linguistic repertoire; using funds of knowledge that ELs bring to their learning),
- Providing comprehensible input to ELs,
- Promoting oral language development to enhance academic learning (using verbal scaffolding in the new language; meaningful practice opportunities; promoting student to student interactions), and
- Using culturally and linguistically responsive formal and informal assessment to analyze learning and provide feedback.

**Helping English Learners Develop Proficiency in Academic Language**

Academic language has been defined by Chamot and O’Malley (1994) as “the language that is used by teachers and students for purposes of acquiring new knowledge and skills, imparting new information, describing abstract ideas, and developing students’ conceptual understanding” (p. 40). Academic language encompasses vocabulary, syntax, language conventions, and the discourses associated with academic genres. In addition, language demands are shaped by the language functions that are aligned with particular academic tasks (e.g., comparing/contrasting information, summarizing, evaluating). The language functions identified by Chamot and O’Malley are those commonly associated with thinking skills.

Bilingual and second language education experts underscore the importance of exposing ELs to the language features characteristic of academic language because mastery of academic language is crucial in developing academic literacy and meeting grade-level standards (DeJong and Harper, 2005; Garcia, 2009; Gibbons, P., 2009; Snow & Katz, 2010). Cummins (2000) first raised awareness about important differences between developing proficiency in social language and academic language. His research showed that it takes significantly more time for language learners to reach a level of language proficiency that allows them to perform academically at the same levels as their English speaking peers than it takes for them to acquire the social language needed to negotiate social interactions in and out of school.

For ELs to develop proficiency in academic language, teachers must provide them with repeated exposure to academic language through the use of varied instructional methods (Chamot & O’Malley, 1994; Echevarria, et al., 2010; Gibbons, 2009; Snow & Katz, 2010). It is important to note that teaching academic language is not unique to second language teaching practices. In fact, English speaking learners also need to be exposed to opportunities to learn and practice academic language to access complex texts, which is a goal of the Common Core State Standards Initiative (www.commoncore.org).

Second language experts like Gibbons (2009) and Kinsella (2005) emphasize the need for teachers to carefully delineate what vocabulary should be taught and provides several suggestions for teachers to employ when supporting ELs in their mastery of academic language including how many words to emphasize in a lesson and how to making use of word relationships. One strategy recommended for use during English Language Development (ELD), i.e., time allocated specifically to increasing proficiency in the new language, is frontloading (Dutro & Kinsella, 2010; Dutro & Moran, 2003). Frontloading is exposing ELs to grammar, vocabulary and language functions before the introduction of key concepts, classroom activities, and assignments. It is an instructional routine that is described by the authors as

…instruction that occurs throughout the day as a horizontal slice of the curriculum, across all content areas. The term front-loading comes from the investment world: Front-loading of ELD refers to focusing on language prior to a content lesson. The linguistic demands of a content task are analyzed and taught in an up-front investment of time devoted to rendering a content understandable to the student, which takes in not only
vocabulary but also forms or structures of language needed to discuss the content. The content instruction itself switches back and forth from a focus on language to a focus on content and back to language (p. 230).

Frontloading is not to be confused with teaching lessons on isolated grammar points or language structures, an approach that has been demonstrated to be ineffective for advancing language proficiency in ELs (Lyster, 2004). Different genres will contain different sets of language functions, language structures and content specific vocabulary, and invoke different ways of engaging with text. Teachers should introduce relevant vocabulary and language structures as part of the instruction around the topic or text under study and reinforce them during instruction. Echevarria, et al (2010) argue that academic language must be reviewed and reinforced throughout a lesson for ELs to assist ELs in making direct connections between past and new learning. Based on a review of studies from Canadian immersion classrooms, Lyster (2005) illustrates the importance of instruction that includes opportunities for focused, controlled language practice, i.e., opportunities for building language awareness and noticing complex language structures required to complete the task, in addition to communication focused practice.

In sum, second language scholars agree that instruction needs to be guided by language objectives as well as content objectives. These objectives can change over time. For example, as ELs develop writing proficiency in English, instructors can transition from language objectives that focus on the basic elements of effective writing to more sophisticated elements of writing such as “voice” and “word choice”. (Echevarria, et al., 2010).

Using Linguistic and Cultural Resources to Enhance New Learning

The importance of building new learning on a learner’s existing knowledge is grounded in constructivist theories of cognition and learning. Providing opportunities during lessons for learners to share and use what they already know or to explicitly tie what has been learned previously to new learning is a common practice in most second language teaching contexts (Echevarria, et. al., 2010). ELs bring to their learning a range of linguistic and cultural assets that are resources for instruction. Viewing multilingualism and diverse cultural knowledge and experiences as resources for instruction shifts the focus from teaching practice that builds background knowledge to fill deficits in learners’ prior knowledge to practice that builds ‘on’ background knowledge to enhance learning new content. The unique resources that ELs bring to the classroom include: (1) a linguistic repertoire that is multilingual and crosses language boundaries; and (2) “funds of knowledge” grounded in rich cultural and community contexts in which they live and learn outside of school. The ways in which each of these assets have been incorporated into teaching practice are described below.

Using ELs’ Full Linguistic Repertoire during Instruction

Research suggests that there are important relationships between native and second language literacy development (August & Shanahan, 2006; Richies & Genesse, 2006) and that supporting home language helps develop second language literacy (August & Shanahan, 2010; Escamilla, Hopewell, Geisler & Ruiz, 2007; Garcia, 2009; Goldenberg, 2013; NCELA, 2011). For example, successful learners who are literate in their native language make use of cognates and apply previously learned comprehension skills to facilitate learning to read in their second language (Faulkner-Bond, 2012; Jimenez, Garcia & Pearson, 1995). August, Calderon, and Carlo
(2002) found that Spanish speaking students knew significantly more cognates than their English speaking counterparts, which enhanced their English language acquisition. Lucas & Katz (1994) found that exemplary programs were places where children were encouraged to use their native or home languages to assist one another, tutor each other, and interact socially. Teachers used children’s native languages to check for comprehension, translate terminology and interact socially with children.

New research is yielding recommended practices that assist bilingual children and teachers in making strategic connections between new and home languages (Celick & Seltzer, 2013; Escamilla, Hopewell, Geisler & Ruiz, 2007; Garcia & Wei, 2014; Velasco & Garcia, 2014). Engaging learners in strategic comparisons of the home and new languages e.g., emphasizing certain English phonemes and combinations of phonemes that don’t exist in Spanish can serve bilingual learners in their literacy development (August and Shanahan, 2006). Translanguaging has been recommended as a teaching strategy to scaffold learning using a series of practices that engage children in investigating comparisons across languages. These include promoting multilingual research, comparing multilingual texts, using cognate charts and multilingual vocabulary and syntax investigations among others (Celick & Seltzer, 2013). Translanguaging is also a self-regulatory mechanism used by bilingual learners when problem solving during writing tasks to achieve particular rhetorical purposes, and should be supported by teachers by providing spaces for bilingual learners to translanguate during different stages of the writing process (Velasco & Garcia, 2014).

English speaking classroom teachers not proficient in their students’ native language(s) and culture can support the use of students home languages by encouraging children who share a common language to work together (Fassler, 2004), by including well written bilingual books and resources in the classroom, by posting multilingual classroom displays (deJong & Harper, 2005), and by engaging learners in investigations of their languages (Celik & Seltzer, 2013)

Using Learner’s Background Knowledge and “Funds of Knowledge” to Support Learning

ELs benefit from connecting their knowledge of home and community to the learning process. In a review of literature on the pedagogical dimensions of a “funds of knowledge” framework grounded in the work of Luis Moll and his colleagues, Rodriguez, (2013) identified several classroom practices that have been effectively used by teachers of culturally and linguistically diverse students to enhance their learning. These practices encompass projects that directly tap into home/community resources such as projects where children gather information from family members or focus on solving a problem in their local community.

Research offers a variety of ways that teachers draw upon ELs’ cultural capital (Celic & Seltzer, 2013; Dubetz & deJong, 2011; Rodriguez, 2013; Yoon, 2008). In their review of bilingual teacher advocates, Dubetz & deJong (2011) found multiple examples of classroom practice in which teachers made space in the curriculum for students to share their histories and/or build their capacity to resist deficit views of themselves by undertaking focused studies of immigration and contributions of their home cultures and languages, framing classroom discussions around topics that were “culture bound” in classrooms with English proficient students and ELs so that ELs could be experts and have knowledge status. Where the mainstream texts did not include “nonmainstream voices” teachers had students write their own personal histories or those of others with status in the community. Finally, research suggests that
newcomers benefit from teacher created, low risk spaces where they can express feelings resulting from the uprooting experience of migration (Igoa, 1995).

**Providing Comprehensible Input to ELs**

Comprehensible input refers to a construct first operationalized by Krashen (1981) in his seminal work on second language acquisition and learning. Krashen argued that the language that the learner hears (input) must be at a level that is comprehensible to him. The implication for teachers of ELs is that speaking English at a comprehensible level for native English speakers will not support comprehension for an EL without added supports. Although providing learners with comprehensible input is potentially powerful for any learner, it is essential for ELs, particularly those in the lower ranges of English proficiency, to actively participate and learn.

To promote language development, Krashen suggests that teachers must provide input this is slightly above the current level of proficiency of the learner and that is supported by other mediums of communication. Examples from the literature include modeling, using gestures and body language, and providing multiple representations of content, e.g., visuals, manipulatives, graphic organizers, and multimedia (Ballantyne, 2008; Echevarria, et al., 2010; Tellez & Waxman, 2006). For example, step-by-step instructions that are modeled and demonstrated through multiple mediums (oral and written) provide a clear plan of action for ELs and ensure optimal comprehension (Echevarria, et al., 2010). Strategies such as repeating what is said only can aid comprehension if accompanied by other forms of support to reinforce spoken discourse (Telez & Waxman, 2006). It is recommended that teachers avoid the use of idiomatic expressions and adjust the rate and complexity of their speech when interacting with ELs with low levels of English proficiency (Echevarria, et. al., 2010).

**Promoting Oral Language Development to Enhance Academic Learning**

As noted earlier, ELs need to develop academic English to be successful in K-12 classrooms. There are four language modalities that learners use to access language both in and outside the classroom: speaking, listening, reading and writing. Research has demonstrated that there is a correlation between oral language proficiency and literacy development in a second language (August and Shanahan, 2008; Saunders & O’Brien, 2006) and that literacy development can proceed even when oral language proficiency is limited (Riches and Genesse, 2006).

There are three types of instructional routines that seem to enhance oral language development for ELs: (1) teacher scaffolding of language for ELs in classroom questioning and discussion, (2) providing ELs with meaningful practice opportunities, and (3) structuring interactions among ELs and more proficient English speakers. Each of these types of instruction is described in its own section below because, although interrelated, there are nuanced differences in how each routine can be built into instruction in the classroom.

**Scaffolding Classroom Discussions**

Scaffolding generally entails providing support for ELs while teaching a new concept and gradually decreasing the support as students’ mastery of the content increases (Echevarria et al., 2010; DeJong and Harper, 2005; Faulkner et al, 2012). Verbal scaffolding strategies such as
think alouds, paraphrasing, and protracted language events in students’ new language increase their understanding of the content by using their contributions to extend and enhance further explanation and provide corrective feedback (Tellez and Waxman, 2010; Goldenberg, 2013; Gibbons, 2009).

In their review of qualitative studies of effective classroom practices for teaching ELs, Tellez and Waxman (2010) describe protracted language events as dialogues involving teacher and student(s) that are lengthy, where teachers “keep the conversation going” by asking questions to expand the dialogue, paraphrasing or recasting what the learner says. The research they reviewed suggests that protracted language events offer ELs “an opportunity to be understood, a chance for their speech acts to be valued, and the occasion to be corrected for form without humiliation. (p. 261).” Teaching that includes protracted language events encompass structured approaches to classroom dialogue such as “instructional conversations” (Goldenberg, 1992/3; Saunders & Goldenberg, 1999). In instructional conversations, teachers and students are response to what others say, so that each statement or contribution builds upon, challenges, or extends the previous one. Topics are picked up, developed, and elaborated. . . strategically, the teacher (or discussion leader) questions, prods, challenges, coaxes, or keeps quiet . . . he or she manages to keep everyone engaged in a substantive and extended conversation, weaving individual participants’ comments into a larger tapestry of meaning.” (Goldenberg, 1992/3; p.318)

An important feature of any scaffolded conversation is providing students with sufficient wait time to process the information at hand and observe for cues that demonstrate that he/she is ready to share (Echevarria et al., 2010).

Finally, tasks that require children’s use of specific academic language structures or conventions have been shown to be effective in promoting the use of these forms (Russell and Spada, 2006; Saunders & Goldenberg, 2006). Examples from the literature include providing sentence stems or frames that include key vocabulary and grammatical structures and teacher feedback focused on the accuracy of student’s language, referred to in the literature as corrective feedback has been shown to be beneficial in supporting language learning (Russell and Spada, 2006).

Forms of corrective feedback commonly used by teachers include: repeating with or without emphasis what a learner says, recasting (re-forming part of what the learner says so that the utterance is grammatically correct); requesting clarification; comprehension checks and metalinguistic feedback. Studies of corrective feedback have focused on the type, amount, mode of delivery, and the relationship between learner characteristics and feedback (Russell and Spada, 2006). Findings from studies on both oral and written corrective feedback have produced mixed results and it has been difficult to determine whether immediate feedback has any long-term impact on language learners. However, in a meta-analysis of studies on the effectiveness of corrective feedback, Russell and Spada (2006) produced some insights grounded in the existing research that can guide classroom practice. For example, it appears that the degree of explicitness of the feedback may help ELs to notice errors. Thus, whereas studies of explicit forms of feedback in classroom practice like ‘recasting’ have produced mixed results, studies of forms of explicit feedback including comprehension checks, requests for clarification, and metalinguistic feedback have had more impact on learner language. Findings from their analysis of the literature suggest that effective corrective feedback must go beyond recasting a learner’s utterance (re-stating what was said in a grammatically correct way) to include more explicit forms of feedback, e.g., metalinguistic feedback and clarification requests. However, it is
important to note that providing feedback should not be interpreted as correcting every mistake a language learner makes. A decision to focus on language form must be based on an understanding of where the learner is in his language acquisition process and whether the feedback is essential to advancing the learners’ ability to engage with the content.

Providing Meaningful Practice Opportunities

Oral language practice should be specifically aligned with learning objectives (Faulkner, et al, 2012). To promote second language acquisition, teachers need to provide ELs with opportunities to participate in frequent and meaningful practice where they can apply all of their language skills as they engage with content (De Jong and Harper, 2005; Goldenberg, 2013; Tellez and Waxman, 2006; NCELA, 2008; Faulkner-Bond et al., 2012; Chamot and O’Malley, 2006). Brief interactions such as “turn and talks” can promote interaction at a superficial level, but cannot replace significant language practice opportunities built into extended cooperative learning activities where all members are accountable to complete the activity (McGroarty & Calderon, 2005).

Opportunities that are not structured to support the level of proficiency of the learner may be ineffective or potentially counterproductive (Goldenberg, 2013). For learners with low levels of English proficiency, using “guided practice” prior to independent work can lead to more meaningful peer mediated language practice opportunities (Echevarria, et al., 2010; Goldenberg, 2013; NCELA, 2008). In her study of a kindergarten ESL classroom, Fassler (2004) observed how the young language learners relied on: (1) the teacher’s use of patterned language during whole class lessons, (2) the predictable participation patterns she established, and (3) clearly defined lesson formats integrating language and content (e.g., theme based teaching, scripted games) to determine what was going on and how to participate. Fassler observed how children appropriated the teacher’s language, using it for both social and academic purposes during teacher fronted (teacher mediated) and peer-mediated activities. In the next section, evidence of how children can support each other during peer-mediated interactions is explored in more depth.

Promoting Student to Student Interactions

Research suggests that peer-mediated or interactive activities such as group work can help reduce students’ anxiety while developing oral language, increasing attention, comprehension, motivation, and social cooperation (Echevarria et al., 2010; Fassler, 2004; Tellez and Waxman, 2006). Interactive environments where ELs have opportunities to talk lead to improved reading and writing (Genessee and Riches, 2006). Fassler (2004) identified strategies that young ELs used to foster communication during peer-mediated activities including strategies that fostered peer communication across language backgrounds, inducted others into play using English as the lingua franca, and built on the language skills of more proficient peers. These strategies appeared to evolve as a consequence of the teacher’s commitment to building in many frequent and diverse routines involving peer mediated interaction through play or table activities, allowing for children’s individual preferences to when, why, and with whom they like to talk. The researcher discovered that some of the informal contexts for talk in the classroom, which she described as activities where children set the agenda, generated the most peer support for second language learning and use.
The generalizability of the findings from Fassler’s study to all types of classrooms may be somewhat limited by the context in which the study was conducted: a kindergarten classroom where all of the children are ELs. Research on classroom interactions in elementary or secondary school classrooms containing ELs and English speaking students has demonstrated that grouping has to be purposeful and that student-student interactions will not be beneficial if not structured strategically. For example, not all students in pairs and groups will demonstrate equal participation, nor will the simple act of grouping or pairing facilitate actual constructive interaction between ELs and English speaking students (Faulkner-Bond, et al., 2012). Research suggests that English speaking students should be trained to help ELs because they do not intuitively interact with ELs in ways that will support their learning during group work. Studies of peer tutoring, where English peers are trained to interact with ELs, and studies of cooperating learning have produced promising results (August, 1987; Jacob, Rottenberg, Patrick & Wheeler, 1996; Johnson, 1983; Klinger & Vaughn, 2000; Xu, Gelfert & Perkins, 2005).

Using Culturally and Linguistically Responsive Formal and Informal Assessment

A number of scholars have noted that there is significant variability in the amount and kinds of knowledge that children from culturally and linguistically diverse backgrounds bring to the classroom (Echevarria, et al. 2010; Rodriguez, 2013; Tellez & Waxman, 2006). Teachers cannot assume that ELs share common forms of background knowledge, and thus, it is important for them to discover what each student brings and build on that previous knowledge while filling in any gaps. Research suggests that teachers of English medium classrooms must make frequent formal and informal assessments of comprehension and reteach content when it is needed to ensure ELs’ understanding of instructional content (Ballantine, et al., 2008; deJong and Harper, 2005, Echevarria, et al., 2010; Saunders and Goldenberg, 2010).

A wide range of assessment practices are available to teachers; however, to guide their choices for assessing ELs learning, teachers must understand which assessment strategies truly gauge what an EL has learned because those used for native English speakers may not fully reveal an EL’s understanding of the content. Because comprehension and listening skills develop prior to oral proficiency, teachers must recognize that ELs may have extended periods of silence while still being engaged in the lesson (Ballantyne, et al., 2008). Research on the writing of bilingual children has demonstrated that when assessments do not capture the full range of an EL’s language knowledge, then it is possible to misinterpret a learner’s true proficiency as a writer (Edelsky, C. 1986; Escamilla, & Cody, 2001; Escamilla, Hopewell, Geisler, & Ruiz, O., 2007). For teachers who do not speak the language spoken by one or more of the ELs in the classroom, the implication is to scaffold assessments in ways that reduce the language demands as much as possible, such as through the use of graphic organizers or sentence frames as part of assessment or soliciting assistance from other children who speak the same native languages, or strategically using bilingual adults to assist in assessing student learning. It may also mean allowing children to utilize participant structures that they bring with them from outside of school to engage in conversations about content from which teachers can informally assess what they are thinking and learning (Tharp, et. al, 2007).

The review of published research and expert opinions based on research suggest that learning to teach ELs requires preparation in core teaching practices that are proven effective for
linguistically and culturally diverse learners because they support the language learning process while maximizing ELs’ exposure to and engagement with new content.

**Research Methodology**

A mixed method, triangulation design (Crestwell and Clark, 2007) was adopted to investigate how Math Up candidates are prepared to teach ELs, whether they become effective teachers of ELs once they enter the profession, and how their preparation and teaching effectiveness compares to graduates from a traditional preservice program. Using a data transformation model, quantitative and qualitative data have been collected and analyzed separately.

Qualitative data have been coded and then transformed into quantitative data (frequencies). Additional quantitative data include demographic variables, contextual variables (e.g., number of ELs in classroom), pre- and post-program attitude survey data. Qualitative data are used to provide exemplars to support analyses of quantitative data and to offer windows into variations and nuances within specific best practices under investigation. A detailed description of data collection and analysis is provided below.

**Participant Sample**

Program participant from the Math Up Cohort 2 (N=17), Cohort 3 (N=15) and Cohort 4 (N=22) have been invited to participate in the study, as have two cohorts of candidates from the traditional preservice Childhood programs, Cohorts 4 and 5 (approximate N=35). For this report, data from Cohort 2 participants (N=17) are reported in response to the first two research questions. Cohort 2 participants had completed their preservice program, and 12 of them were in their first year of teaching, having been hired to teach in grades ranging from Pre-Kindergarten to Grade 7 during the 2013-2014 school year. The remaining five participants were either not teaching (N=4), or had taken a position in a nursery school (N=1). Observation data are reported for 11 of the 12 Cohort 2 participants who were in their first year of teaching and agreed to participate in the study.

Data from the pre-program attitudes questionnaires of cohorts 2, 3 and 4 (N=54) were used to report on results of investigations of candidate attitudes in relation to childhood language (whether it was English or another language), and data from the pre- and post-program attitudes questionnaire for Cohorts 2 and 3 (N=32) were used to investigate whether attitudes about teaching ELs changed from the beginning to the end of the program since these candidates had all completed the preservice program by Fall 2014.

**Collecting and Analyzing Data on the “Intended” Preservice Curriculum**

The study begins with analyses of the *intended* curriculum of the Math Up preservice program, i.e., course content, assignments, and articulated clinical expectations, and the *experienced* curriculum, i.e., what candidates learned during their preservice preparation as demonstrated in assignments and evaluations of their clinical experiences. To study the intended preservice curriculum, a content analysis was undertaken of course outlines and program specific documents like the program lesson plan format and the program handbook, which includes a rubric adapted from Danielson’s Framework for Teaching (2007) to evaluate interns’ teaching
effectiveness. An analysis of program documents was followed by interviews of course instructors to ensure that approaches to preparing candidates for teaching ELs that instructors employed but did not include in a course outline could be documented.

Each course is designed and taught by university-based and school-based co-instructors. The course outlines include: (1) a course description; (2) a list of course outcomes and relevant standards addressed in the course; (3) an explanation of how the course addresses the School of Education’s theoretical framework; (4) a list of required texts or readings; (5) a schedule of topics; and (6) a description of assignments. In addition, program faculty developed a lesson plan format that would contain key elements that would be addressed in lesson plans across all methods courses. Because of the program emphasis on integrating course content with internship experiences, the number of ELs and children with disabilities in the internship placements were also documented as important variables to be used in analysis.

The analysis of the intended curriculum was conducted using a procedure for content analysis adapted from the research of Pugach and Blanton (2012). A set of guiding questions were formulated to identify articulated conceptions about teaching linguistically diverse learners communicated through course descriptions and overall teacher program structure:

- What conceptions about teaching linguistically diverse learners are communicated through course or program descriptions, course goals, topics, assignments, and readings?
- What kinds of clinical experiences/assignments with ELs are incorporated in course or program content?
- What is communicated about linguistic diversity in relation to other diversities?
- What proportion of courses can be identified as having a major focus on linguistically diverse students and what was the nature of the content focus?
- What is the degree of emphasis on linguistically diverse students across courses as evidenced by texts topics, and assignments?
- To what degree are the needs of linguistically diverse students integrated or separated in course work?
- Do candidates tap any additional resources to increase their effectiveness to teach ELs?

Collecting Data on the “Experienced” Preservice Program

To study what candidates experienced from their exposure to program content, data that would offer insight into candidate learning were collected. These data included: (1) pre- and post- program attitude questionnaires measuring candidates’ attitudes toward teaching academically and linguistically diverse students completed at the beginning and end of the preservice program (see Appendix A for Math Up questionnaire and Appendix B for traditional program questionnaire); (2) candidates’ electronic portfolios containing key assessments from all coursework and internship experiences; and (3) supervisors’ documentation of candidates’ effectiveness in the classroom in the form of evidence collection records. Appendix C provides an overview of these sources as well as the sources collected for during the first two years of teaching. The portfolios were incorporated as a teacher education pedagogy in the Math Up program to serve the dual purpose of helping candidates reflect on their learning and as a tool for assessing their learning (Grossman, 2005).

For Cohort 2, the population sample for which data for the complete preservice experience and the first year of teaching were available, each Math Up candidates’ electronic program portfolio contained 44 artifacts that were collected from the beginning to the end of the
program. A list of these are provided in Appendix C. These artifacts include at least one key assessment from each of the 14 courses, videotaped lessons of the candidates’ instruction along with teaching commentaries/reflections, surveys of dispositions, and teaching philosophies from the beginning and end of the program, evaluations of teaching by supervisors and candidates, and teaching disposition assessments. The key assessments from coursework are directly tied to candidate work in classrooms and encompass studies of student learning, various forms of planning, and reflections on teaching. The assessments provide information about candidates’ preparation to teach all subjects including their knowledge of core standards and assessment strategies.

Additional data collected from the preservice experience included: (1) evidence collection records, which are sets of detailed evidence-based notes prepared by supervisors and organized around the elements in Domains 1, 2, and 3 of the Framework for Teaching (Danielson, 2007) for each of three formal observations during the internship, and (2) the results of the pre- and post- Math Up program attitude questionnaires. The six questions focusing on ELs are boldfaced in the questionnaire in Appendix A (Questions 19, 27, 29, 32, 33, 34).

**Data Collection during the First Two Years of Teaching**

To determine whether the candidates are prepared to be effective teachers of ELs, the investigation continues through their first two years of teaching. Data collected during each of the first two years of teaching include: (1) one classroom observation each year, (2) the results of the New York State English as a Second Language Achievement Test (NSESLAT), which is an annual test of language academic language proficiency completed by all ELs in the New York City public school system, and (3) data from interviews and observations from an investigation of teacher preparation for purposes of triangulation, where possible.

**Qualitative Data Analysis**

Text and videos in portfolio artifacts, the supervisors’ evidence collection records, and the observations of lessons during the first year of teaching were coded using the set of core teaching practices described earlier in the review of literature. Appendix D provides a format for data analysis for the first year observations. The same set of core practices were used to code and analyze the portfolio data. Each effective practice has two to five descriptors that come from the literature. The decision to use a set of core practices for teaching ELs as a lens for analysis was designed to address concerns that have been raised regarding the validity of generic teacher observation instruments in evaluating teacher effectiveness with special student populations (Jones, Buzick, & Turkan, 2013).

For this first technical report, the types and frequencies of core practices from observed lessons in the first two years were compared to the types and frequencies of practices found in the artifacts of learning from the preservice experience. Each example of practice from an observation or a portfolio artifact was coded according to where it occurred and the type of core practice it represented. Qualitative case studies of individual participants were developed using the data once all coding was completed. For the next stage of this longitudinal study, the researcher will be using ATLAS.ti, a qualitative data analysis software, to code examples of core practices and investigate relationships between practices and across time.
Quantitative Data Analysis

Once all qualitative data from observations and portfolio artifacts were coded for core teaching practices, frequencies for each core practice and the total number of practices were added to the data base of demographic, contextual, and survey data. The number of times each core practice was observed in the artifacts and the number of times each is observed in the first year lessons are incorporated into a spreadsheet along with self-report data from the questionnaires and student achievement data to be analyzed for statistically significant relationships. Demographic variables (e.g., participant’s personal experiences with language learning, choice of program) and contextual variables (e.g., type of program, the number of ELs in their classrooms during their internships and first years of teaching) were compared with survey data regarding attitudes toward teaching ELs and the core practices under investigation to explore possible relationships between these variables.

Nonparametric tests for data sets with small sample sizes were used to produce findings for this first technical report, including Chi Square and Mann-Whitney tests in addition to descriptive statistical summaries with percentages, means, and standard deviations and Wilcoxon Signed Ranks. As the data set expands, appropriate inferential statistical tests such as t-tests and ANOVA will be used to identify constellations of core practices and dispositions that seem to correlate with effective practice in teaching ELs.

Findings

In this section, findings are presented for the first two research questions in this investigation using the available data described in the methodology section:

1. How does the Math Up Program prepare candidates to teach emergent bilingual learners (EBLs) or English learners (ELs)?
2. How effectively does the Math Up Program prepare candidates to be effective teachers of emergent bilingual learners (EBSs) and English learners?

Results focusing on core practices in this report are from data collected on Cohort 2 participants, who began their preservice preparation in the spring of 2012 and completed it in the summer of 2013. Twelve of the 17 members of Cohort 2 were hired as teachers during the 2013-2014 school year, and 11 agreed to be observed during their first year of teaching. Results from analyses of the pre- and post-program attitude questionnaires included data from Cohorts 2 and 3. Cohort 3 began preservice preparation in 2013 and completed it in the summer of 2014. Results of the analysis of the relationship between pre-program responses to questions on the attitude questionnaire and childhood language are based on data from Cohorts 2, 3, and 4. Cohort 4 began in the spring of 2014 and is currently approximately halfway through the preservice program.
Research Question 1: How does the Math Up Program prepare candidates to teach emergent bilingual learners (EBLs) or English learners (ELs)?

Findings for the first research question are divided into a reporting of the findings for the intended Math Up curriculum and for the Math Up curriculum as experienced by participants.

Findings Regarding the Intended Math Up Curriculum

The first step in answering the first research question was to document the preservice Math Up curriculum, what is referred to in this investigation as the “intended” curriculum. A content analysis of preservice curriculum documents was undertaken to answer key questions regarding the content and structure of the program. Data were gathered from program documents and interviews with one instructor for each course in the curriculum for Math Up Cohort 2. Table 1 on pages 63-64 provides a chart of the locations of evidence of linguistic and cultural diversity in each program artifact. Findings for each key question are provided below:

1. **What conceptions about teaching linguistically diverse learners are communicated through course descriptions?**

   Six courses specifically refer to linguistically diverse students in the course descriptions. Of these, three were taken by all Math Up candidates (EBS 701, EDE 727, EDS 707), two were taken by the candidates in the bilingual extension program (EDE 738 and EDE 739), and one additional course (EBS 743) was an optional course offered for candidates who are interested in taking a second course in special education.

   All candidates take a course (EBS 701) early in the curriculum sequence that introduces candidates to “the nature of bilingualism as a societal and individual phenomenon” and involves “in-depth study of linguistic, applied linguistic, psycholinguistic, sociolinguistic, neurolinguistic, and educational aspects of bilingualism.” This course provides a foundation in language acquisition and development in bilingual children through the development of a case study of a bilingual/English learner. The second course, EDE 727 focuses on “methods and materials for teaching children whose native language is not English” and teaching “content with an emphasis on English Language Arts using English as a second language methodologies.”

   Two additional courses focusing on developing a knowledge base for assessing and teaching children with special needs (EBS 707, EBS 743) include references to “linguistically and culturally diverse” children in course descriptions only.

   Candidates seeking the bilingual extension take two methods courses (EDE 738; EDE 739) in which they learn strategies to teach literacy and social studies in children’s native Spanish language. Course descriptions emphasize the investigation of “the diverse ways that bilingual bicultural children” develop language, literacy and social studies knowledge.

2. **What kinds of clinical experiences/assignments with ELS are incorporated in course or program content?**

   Only one course (EBS 701) requires fieldwork specifically related to working with linguistically diverse learners for all candidates. This assignment required candidates to use a range of assessments (oral language, literacy, math; in English and in Spanish for bilingual
candidates) to document the language proficiency of an emergent bilingual learners and to make general recommendations for programming and instruction based on what is learned.

The program handbook identifies work with ELs as part of the program’s fieldwork; however, placement in a classroom with ELs was only a requirement for placement for those candidates seeking a bilingual extension. In Cohort 2, 16 out of 17 candidates completed internships in classrooms where there was at least one English learner. In addition, all candidates visited classrooms with ELs as part of required monthly school inter-visitations. The focus of each of nine observations during inter-visitations was one teacher performance indicator from domains 2 (the classroom environment) or 3 (instruction) of Danielson’s Framework for Teaching (2007). Candidates were asked to develop a log that included notes and evidence and a summary reflection on the particular indicator. These performance indicators do not focus on specific student populations such as ELs, but rather emphasize meeting the needs of all learners in the classroom.

3. What is communicated about linguistic diversity in relation to other diversities?

In many of the courses, linguistic diversity is communicated as one of several forms of student diversity that the candidates are expected to respond to in their planning and instruction. Linguistic and cultural diversity are often listed in course descriptions or in assignments with other kinds of diversity including special needs populations (e.g., children with disabilities, experiencing difficulty learning mathematics), underserved populations, and struggling readers. This holds true for field-based assignments and evaluations across the program.

The first field based assessment that refers to linguistic diversity as one of several diversities is a self-assessment video and reflection. In early October, interns video tape themselves teaching, meet with their supervisor to discussion the video, and write a reflection that includes the question: “In what ways did your knowledge of students, e.g., content knowledge and understanding of key mathematical concepts…language proficiency…in planning the delivery of this lesson and assessment of student learning?”

Second, formal observations in the internship are evaluated using the Danielson Framework, and once again, candidates are expected to respond to multiple forms of diversity simultaneously. There are three documents that are completed for each of three formal observations conducted over the year (December, February, and May). On the pre-observation form prepared by the intern for the supervisor, s/he is asked to explain how s/he will “differentiate the task for individual students or groups of students (English Language Learners, Special Education, Gifted and Talented).” In the post observation reflection, s/he must explain how successful specific groups of students were in meeting the lesson outcomes, including ELs along with special education and gifted and talented students. One of the 22 Danielson rubrics developed for the Math Up program includes specific reference to ELs. To achieve a distinguished level for Demonstrating Knowledge of Students (1B), there must be evidence that the “teacher actively seeks knowledge of students’ levels of development and their background, cultures, skills, language proficiency, interests, and special needs from a variety of sources.”

The final reference to ELs in the field based instruments is a dispositions rubric that is completed by the mentor teacher to evaluate the intern’s professional behaviors and dispositions. A candidate does not meet the disposition regarding sensitivity to individual differences if the intern “holds lower expectations for minority students, or/and English Language learners, or/and students with special needs.”
4. **What proportion of courses can be identified as having a major focus on linguistically diverse students and what was the nature of the content focus?**

Of the fifteen-course curriculum required of all participants, two courses, “Issues in Bilingualism” and “Teaching English as a Second Language,” have major foci on linguistically diverse students and are taken sequentially during the first summer of the program following two foundations courses (child development and family/school/community) and two methods courses (math and art), and prior to the beginning of the year-long internship experience. Providing this exposure to teaching ELs in the first summer of the program is intended to build intern’s level of understanding and theoretical frameworks for understanding and supporting language development prior to entering their internship classrooms.

The Teaching English as a Second Language methods course is where candidates build their capacity to plan for instruction that encompasses core teaching strategies that promote academic content learning for ELs. In this course, candidates were exposed to core teaching practices using the Sheltered Instruction Observation Protocol (SIOP), which is divided into 30 “indicators” of effective sheltered instruction organized around eight general areas of lesson preparation, instruction and review/evaluation (Echevarria, et. al., 2010). For example, under the general area of “Practice/Application, there are three indicators, e.g., “provides activities for students to apply content and language knowledge in the classroom (indicator #21).” Research has shown that the practices identified in the SIOP, which consistently implemented during classroom practice, lead to improved learning among ELs at varied grade levels in assessments in the skills used to read and write in academic content areas. Although the SIOP practices are consistent with the core teaching practices identified in the literature review, they do not emphasize some of the types of practice identified in the literature such as promoting hybrid language practices or code switching are provided as supplemental information in the bilingualism course. Furthermore, some approaches to core practices, in particular, using protracted language events, frontloading, and using corrective feedback are not addressed.

Candidates in the bilingual extension have an additional two courses with a major focus on linguistically diverse students, “Teaching Literacy in Bilingual/Bicultural Settings-Grades 1-6 (EDE 738)” and “Learning and Teaching Social Studies in Bilingual/Bicultural Settings and Learning Grades 1-6 (EDE 739)”. Key assignments include an inquiry project focusing on a question of interest regarding literacy instruction for bilingual, bicultural children (EDE 738) and a sequence of lesson plans (EDE 739).

5. **What is the degree of emphasis on linguistically diverse students across courses as evidenced by texts topics, and assignments?**

Six of the 12 courses (50%) that constitute the core curriculum for all candidates include goals and outcomes specifically related to teaching linguistically diverse students. An additional five courses include outcomes focusing on teaching diverse learners more generally. The six courses taken by all Math Up candidates include linguistically diverse learners as the focus of at least one course session (EDE 715, EBS 701, EDE 727, EDE 621, EDE 740, EDS 707), and/or through assigned readings (EBS 701, EDE 727, EDS 707, EDE 744). Despite the explicit attention to linguistic diversity in goals for half of the courses in the program, at the level of course topics, readings, and assignments, the number of specific references to linguistic diversity
fall to 27% (N=3). Only one course requires fieldwork specifically related to working with linguistically diverse learners.

Assignments in the two courses focusing on ELs and required for all candidates are coordinated so that the key assessment from the first course, which is a case study of an EL, serves as the foundation for a key assessment in the second course, which is a theory of practice reflection in which candidate describes the relationship between the EL case study and sheltered instructional plans s/he developed in the second course.

6. To what degree are the needs of linguistically diverse students integrated or separated in course work?

In reviewing the findings for questions 1-5, it becomes apparent that in course goals and in the forms of evaluation developed for candidates’ field-based internship, the needs of linguistically diverse students are integrated with the needs of learners in general and in combination with other types of diversity in planning for and delivering instruction, and in assessing student learning.

At the program structure level, there are particular courses that focus on particular populations of students and two of the courses taken by all candidates specifically focus on bilingual learners or ELs, just as there are courses that focus specifically on children with special needs. To have more preparation to teach ELs through coursework, a participant must be in the bilingual extension program. This decision also guarantees that they will work with ELs in their year long internship.

7. Did candidates tap any additional resources to prepare them to teach ELs?

Educational Testing Service partners with the program to offer webinars each year for candidates and program graduates. Two of these webinars to which Cohort 2 participants were invited focused specifically on assisting ELs in meeting Common Core State Standards; however, none of the Cohort 2 participants joined either of these webinars.

Findings Regarding How Candidates Experienced the Math Up Curriculum

To determine how the Math Up preservice curriculum has prepared candidates, it was important to document how the candidates experienced the intended curriculum described in the previous section. The findings include an analysis of data from self-reported attitudes from pre- and post-program attitude questionnaires and the products of the curriculum, which included artifacts from the electronic portfolio and the evidence collection records from supervisors. This section begins with a case study of core practices identified in the portfolio artifacts of a candidate from Cohort 2 to illustrate through rich description how the candidate experienced her preservice preparation. Following the case study, some preliminary findings regarding candidate attitudes toward teaching ELs at the beginning and at the end of preservice preparation are presented.
Artifacts as a Measure of Candidate’s Preparation: A Case Study

The analysis of portfolio data was undertaken by reviewing the content of the electronic portfolios for evidence core teaching practices for ELs. Of the 44 artifacts that were reviewed, 15 provided explicit evidence of effective practices. These artifacts included: (1) lesson plans or lesson units, (2) videos of practice, and (3) commentaries on practice (including those by the candidate or by the supervisor). Table 2 on page 65 provides a list of the core practices found in these artifacts.

The candidate was in the program leading to a bilingual extension and completed her year-long internship in a dual language first grade classroom. Her childhood language was Spanish. Table 2 charts the frequency of applications of each of the core practices for ELs found in her portfolio artifacts. As can be seen in the table, although all practices were found in the work she produced and the teaching she engaged in during her preservice experience, some were applied more frequently than others.

The candidate showed evidence of a commitment to plan for and teach grade appropriate content and addressing the language demands related to the content. The majority of the examples related to language demands focused on teaching key vocabulary (e.g., “students will use vocabulary words to record and explain their answers” and we will review all four coins, names and values”), or engaging students in one of the four general language skills (e.g., “SWBAT listen to a speaker talk about the community workers, and write about the community workers they wish to be”).

Practices applied with the highest frequency in her work were: (1) providing learners with comprehensible input (N=33), (2) using the native language to support children’s learning (N=27), (3) using formal and informal assessment practices to gather information about children’s learning and provide feedback (N=20), (4) grouping to support student to student interaction (N=17), (5) building on children’s background knowledge (N=10), and (6) providing meaningful practice opportunities (N=9).

It is important to note that high frequencies in particular practices may be a consequence of the nature of key assessments in the portfolio. For example, a majority of the artifacts offering evidence of core teaching practices were lesson or unit plans. The format and content of lesson plans provide ample space for incorporating practices that will provide comprehensible input during a lesson. In contrast, evidence of verbal scaffolding requires artifacts designed to reveal what goes on during actual teaching. There were fewer of the kinds of artifacts that provide evidence of actual teaching, e.g., self assessment video, supervisors’ evidence collection records. This might explain the small number of examples of verbal scaffolding (N=6) in the candidate’s portfolio as opposed to the alternative explanation, which is that the candidate chose not to use verbal scaffolding as often as other practices.

It is important to look deeply at the examples of a particular core practice to uncover what they reveal about the preferences of a candidate. For comprehensible input, the candidate favored the use of visuals including videos, materials, graphic organizers, and modeling to support student learning. To build background knowledge, the candidate focused almost exclusively on soliciting children’s prior learning around a topic. She used a K-W-L chart or would build in a question or turn and talk to solicit information about previous learning (e.g., “I will have the students think-pair-share in a discussion about the community helpers we have covered so far.”)
There was evidence of the candidate using children’s resources to enhance learning. The candidate was in a dual language classroom and employed two approaches to using the native language with a fair amount of frequency (27 incidences). One approach was teacher or students translating a question or an answer into the other language. The second approach was the teacher’s acceptance of children’s language preferences when they asked or responded to a question even though the language of instruction at the time was English. These approaches were both built into her planning, her reflections on planning and teaching, and were evident in her self-assessment video.

Although there were not a large number of instances of verbal scaffolding, the examples that emerged from reflections on teaching practice or in a required video included in the portfolio provided evidence of the candidate’s ability to strategically extend a discussion by repeating, rephrasing, and reframing language by embedding additional information. Although the candidate mentioned providing wait time in her planning, she seemed to favor the strategies listed above in the video of her teaching over stopping and waiting for a child to think before responding.

Three teaching routines—meaningful opportunities for practice, connecting oral language development with literacy development and grouping for student interaction—seemed closely associated with each other in the candidate’s planning and instruction. For example, all but one of the examples of planning for meaningful opportunities for practice was organized as pair or small group activities. There were multiple examples of her using language proficiency as a criterion for planning for groups (e.g., “lower beginning students will be paired with higher beginning students”). Some of her reflections on teaching illuminated the benefit she saw in making such choices (e.g. “talking to other peers and working in groups provides the opportunity for her to practice oral rehearsal…throughout this activity M. must interact in discussions with her peers…”).

There were no examples of explicitly preparing more proficient students (in either language) for how to work with less proficient students, nor was there evidence in the artifacts that group activities were structured in ways that require individual accountability or equal participation from all children. Examples of explicitly planned connections between oral language development and literacy development in the artifacts incorporated activities such as group role playing and collaborative exploration of tools before writing about them.

Finally, the candidate’s preferred forms of informal assessment were questioning and observation. Preferred forms of formal assessment were either worksheets or work products, some of which were individual and a few which were group work projects. Her willingness to invite children to use Spanish to communicate what they did not understand or what they knew as a form of informal assessment reflected her ability to choose linguistically responsive forms of assessment. There was one instance of the candidate providing sentence frames and a word to scaffold student writing in the new language.

Candidate Attitudes as a Measure of the Experienced Curriculum

As part of the investigation, candidates completed a questionnaire that included questions revealing attitudes about the impact of language proficiency on a child’s learning. The results of their self-reported attitudes was deemed important to study because responses could potentially shed light on whether the teaching choices that participants made either while working with ELs in their internship or in the planning they engaged as part of course assignments might be
affected by how much of an impact they believed language proficiency had on a child’s learning and behavior in the classroom.

Before investigating whether there was a shift in attitudes about teaching ELs between the beginning and the end of the program, the researcher decided to explore whether candidates who grew up speaking a language other than English entered the preservice program with different attitudes about teaching ELs than those who grew up speaking English. Data for Math Up participants from Cohorts 2, 3, and 4 were used (N=55) to analyze childhood language in relation to responses to questions on the pre-program attitude survey. Results showed no significant relationship between candidates who spoke a childhood language other than English and candidates who were English speakers as children. The histograms produced using the Mann-Whitney test showed similar distributions of responses for each group on each of the survey questions focusing on teaching ELs.

An analysis of differences between cohorts 2 and 3 candidates’ attitudes toward teaching ELLs at the beginning and end of the program changed using a Wilcoxon Signed Ranks test (non parametric test) produced no significant findings. Whether there was a difference in attitudes between candidates who had no ELs in their internship classrooms and those who had ELs in their classrooms was not undertaken because of the 29 participants, only 5 of 29 candidates had not had ELs in their classroom. As Cohort 4 data is added to the data base, it may be possible to undertake this level of investigation. A descriptive summary of results for each question related to attitudes regarding teaching ELs is provided below.

Pre & Post Program Questionnaire Responses on Attitudes Regarding Teaching ELs

<table>
<thead>
<tr>
<th>Notes:</th>
<th>Pre 19 &amp; Post Q 18 used a scale 1 to 8, 1 being “not at all dependent” to 8 “being completely dependent”</th>
<th>Other questions used a scale of 1 to 8, 1 being “strongly disagree” and 8 being “strongly agree”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>PRE-PROGRAM RESPONSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Q19 To what extent do you believe that a student's performance in mathematics is dependent upon whether that student is proficient in English?</td>
<td>29</td>
<td>4.24</td>
</tr>
<tr>
<td>Pre Q27 Truly understanding mathematics in the math classroom requires special abilities that children who are not proficient in English do not possess.</td>
<td>29</td>
<td>2.45</td>
</tr>
<tr>
<td>Pre Q29 General education teachers who have children who are not proficient in English in their classrooms cannot be as effective at teaching math as teachers who do not have English language learner in their classrooms.</td>
<td>29</td>
<td>2.93</td>
</tr>
<tr>
<td>Pre Q32 Children who are not proficient in English cause most behavioral problems that occur during literacy instruction.</td>
<td>29</td>
<td>2.21</td>
</tr>
<tr>
<td>Pre Q33 Children who are not proficient in English cause most behavioral problems that occur during math instruction.</td>
<td>29</td>
<td>2.10</td>
</tr>
<tr>
<td><strong>POST-PROGRAM RESPONSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Q18. To what extent do you believe that a student’s performance in mathematics is dependent upon whether that student is proficient in English?</td>
<td>29</td>
<td>3.66</td>
</tr>
<tr>
<td>Post Q26. Truly understanding mathematics in the math classroom requires special abilities that children who are not proficient in English do not possess.</td>
<td>29</td>
<td>2.38</td>
</tr>
</tbody>
</table>
Finally, an investigation was undertaken of the relationship between the number of ELs in an internship classroom and attitudes at the end of the program. Data were used from Cohorts 2 and 3 (N=29). The number of ELs in a classroom was considered an important variable because Math Up was a clinically rich program, the internship was a central learning experience for preparing to teach, and one of the goals of the program was to prepare all teachers for special populations of learners including ELs. The analysis produced no significant relationship between the number of ELs in the class and the responses to the post attitude survey questions regarding whether language proficiency had an impact on a child’s learning and behavior.

**Research Question 2: How effectively does the Math Up Program prepare candidates to be effective teachers of emergent bilingual learners (EBSs) and English learners?**

To answer the second research question, data for 11 Math Up graduates from Cohort 2 who were hired at teachers during the 2012-2013 school year and who agreed to participate in the study were observed for what the teacher identified as a complete lesson. The researcher had asked to observe a lesson from its beginning to its end. All lessons observed were in either math or language arts, a choice made by the teacher who had been invited to choose any lesson in any subject for observation. The grade levels ranged from prekindergarten to grade 7.

A reporting of the findings is divided into 3 sections: (1) a description of the core teaching practices found in the 11 observations, (2) a case study of the practices identified in the classroom of the participant whose preservice experience was presented for research question one; and (3) preliminary findings from an investigation of the relationship between the number of core teaching practices observed in first year lessons and (3a) candidates’ attitudes toward teaching ELs at the end of their preservice experience, (3b) the number of ELs in their preservice internship, (3c) the grade level in which they were teaching, and (3d) the number of ELs in the first year classrooms.

**Section 1. Description of Observed Practices during First Year of Teaching**

The length of a lesson was determined by the teacher, and ranged from 27 minutes to 95 minutes. In order to compare the frequency of practices across lessons of differing lengths, a ratio of the total number of practices employed by the teacher to the length of the lesson was factored by dividing the total number of practices observed by the total number of minutes of the lesson. The higher the result, the more frequent the use of effective practices during the lesson on average. The range of frequency of observed practices was as low as 7 and as high as 30.

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3 Cohort 4 had not completed the post program survey at the time this report was written.
Table 3 provides a summary of the number of times each practice under investigation was applied during the 11 lessons observed and the number of teachers who instituted the practice at least once during instruction. The content analysis of the effective practices observed in the lessons of the first year teachers produced the following results:

- All 11 lessons observed focused on grade appropriate content, which was reflected in the activities and the instructional resources used. Three of the teachers included a visual presentation of the content objective of the lesson in addition to orally stating what students would be learning. In the remaining 8 classrooms, teachers either stated what children were going to learn orally (N=2), or the purpose of learning was to be inferred from the content and tasks presented to the children (N=6).

- In all 11 lessons observed, teachers emphasized content specific vocabulary. Three teachers provided repeated exposure to academic language structures needed to organize or communicate ideas, though no teacher explicitly taught syntactic or discourse forms required to communicate academically during the observed lessons. Instead, teachers modeled the vocabulary and language structures to be used in their own communication and solicited specific vocabulary from a learners (e.g., Teacher asks, “two more what? in order to have student say “grams”). No teacher shared language objectives with the students orally or visually.

- There were 25 incidents of verbal scaffolding identified across the 11 lessons by engaging in extended dialogues with children, using strategies like re-casting children’s utterances, and providing wait time.

- Nine of the teachers incorporated opportunities for children to engage with content orally in order to scaffold reading and writing (and in one incident the opposite was observed when a teacher had the children write questions first and then use these to engage in a book discussion). Teachers often incorporated turn and talks or solicited oral responses before having children write or read.

- Providing comprehensible input for learners was the most prevalent practice found in the 11 lessons (N=30 incidents). Teachers used a variety of visual supports during instruction including charts or PowerPoint displays and Smart Board technology; manipulatives and realia; and graphic organizers. Also prevalent in the lessons was the use of teacher modeling to provide learners with an example of ways they were to engage with the content and use key vocabulary when working in groups or independently. Paraverbal (e.g., volume, intonation, rate of speech) and nonverbal cues (gestures) were also employed to scaffold what teachers were saying or reading aloud.

- Across all observed lessons, all students were expected to complete the same activities during practice, and there was no evidence of specific attempts to differentiate these activities to ensure meaningful opportunities for practice for ELs. What teachers did to support ELs during practice tasks was to group ELs at tables with proficient English speakers. However, in only two cases were tasks structured to promote the positive interdependence and individual accountability associated with cooperative group work. Furthermore, the teachers did not appear to incorporate explicit direction for the proficient English speakers as to how to assist the ELs in completing the task while in groups. Only one teacher explicitly publically recognized how a native English speaker could assist an EL by pointing out to the class after a pair activity, “I noticed that G was able to translate some things in Spanish for D and was also using her hands to show A
shapes.” It is important to note that very few of the classrooms observed (N=2) contained ELs who were newcomers.

- Ten of the teachers connected new learning to their students’ background knowledge to scaffold learning. In all cases this practice was used to solicit information from students about relevant previous learning or reviewing previously learned material. This was sometimes done as a whole class and other times through brief turn and talks.

- The use of children’s native language was observed in four of the 11 lessons. In three of these classrooms, the teachers were graduates of the bilingual extension program and engaged in translanguaging to define a key word in Spanish, checking for comprehension with a Spanish dominant learner, or assisting Spanish dominant children in a task during practice and small group activities. In the fourth classroom, students were heard speaking Spanish to each other and these exchanges were both related to the math task at hand at times, and not related to the task at other times. In this classroom, the teacher was not bilingual.

- There was a high frequency of use of informal and formal assessment practices in the 11 lessons observed (N=30 incidents). Informal assessment examples were almost exclusively of two kinds: the regular use of questions regarding content and teacher observation of student work during group or independent practice. Formal assessment information was gathered by the completion of work (e.g., problems solved on worksheets). In some cases, the students’ work was shared in a whole class discussion.

- There was one teacher who explicitly used forms of feedback that demonstrated sensitivity to the second language acquisition process. When an EL provided an ungrammatical response, the teacher nodded and reframed what a child said using correct grammar. This same teacher also accepted nodding from an EL as an appropriate nonverbal response rather than requiring a verbal response to a question she asked. There were no documented examples of children sharing their responses to a question in Spanish.

- There were no examples of the kind of corrective feedback recommended in the research literature.

- There were no incidents of teachers using materials that specifically tapped into students’ cultural or community knowledge, nor was there any teacher/student interaction demonstrating an awareness of the acculturation process. There was one “multicultural” activity in which the teacher showed a series of slides of forms of dress from people in different cultures but the teacher made no attempt to engage the Chinese or the African students in the class to validate or talk about the pictures of Chinese and African dress that were displayed.

Section 2: A Case Study of Core Teaching Practices during First Year of Teaching

The case study participant, whose use of core practices during her preservice preparation was described earlier, applied all core practices in the lesson observed during her first year of teaching in a Universal PreK classroom where English was the language of instruction, though some were used with more frequency than others. A summary of core teaching practices and the artifacts in which they occurred is found in Table 3 on page 66.
There was many examples of comprehensible input and opportunities for children to practice language in meaningful ways. The practice of using the native language, which was pervasive in her preservice artifacts, was used with less frequency in the lesson observed in her first year of teaching; however, unlike her preservice internship in a bilingual classroom, she was teaching in an English medium classroom. The teacher did not group children by language proficiency, a practice she used frequently during her preservice planning. Instead, she allowed children’s choice of activity determine the groupings and the ELs (n=2) chose centers that were also chosen by English proficient children, and so had opportunities to interact with English speaking peers.

In contrast to the evidence produced in her preservice artifacts, here was ample evidence of verbal scaffolding during the lesson. The following exchange at the focus table with a Spanish speaking EL illustrates how she used verbal scaffolding to solicit more details from the child about the theme of water conservation under study and to further build academic vocabulary thought the modalities of speaking and writing.

Teacher: “What is your favorite part of the book?”
Child begins to draw a picture of his favorite part of the book.
Teacher: “What are you drawing now?”
Child’s response unrecorded.
Teacher:” Do you want to look at the book again?”
Child nods.
Teacher offers the book to the child and asks “What was your favorite part of the book?”
Looking at the pages of the book, the child “labels” pictures with words he knows, for example, he points to a picture of water and says “water.” The teacher extends his response to incorporate the theme of the book by saying, “conserving water, conservation.”

Child looks at a picture of a rain cloud and says, “Cloud in the water.” The teacher recasts his response by turning it into a question
Teacher: “The water is in the cloud?”
They look at a picture of a bathroom in the book and the teacher says something in Spanish. The child points to the page and says, “bubble guppy.”
Teacher: “How--What do you call that? Do you remember the name?”
Child: “Toilet water.”
Teacher: “There’s water in the toilet.”
Teacher points to the pipes in the picture and explains that there are pipes connecting the toilet to the water.

As can be seen in Table 3, the teacher used 10 of the 11 practices under investigation during her lesson to promote language development. The only practice not observed as the use of culturally responsible pedagogy, though she did tap into the child’s background knowledge when during the exchange at the focus table, she asked the child in Spanish whether his mother cooked spaghetti using water. (One of the pictures in the water conservation book was a mother putting water into the pot to cook spaghetti.)
Section 3: Comparison of Core Practices in the First Year of Teaching to Other Factors

3a. Comparing Candidate Attitudes with Core Teaching Practices

The number of participants who were observed in their first year of teaching (all from Cohort 2) was small (N=11); thus, only descriptive statistical summaries are provided and conclusions are preliminary in comparing the core practices used during lessons and the attitudes that participants held at the end of their preservice program about the impact of language proficiency on a child’s learning and behavior in the classroom.

The investigation of a possible relationship between attitudes about teaching ELs at the end of the program and core teaching practices (CTPs) observed in lessons in the first year of teaching revealed that of the graduate who used core teaching practices 18 or more times in their lessons, more had post-test attitude scores of 10 or above, meaning that they tended to believe that language proficiency has an impact on learning and behavior, than the number of graduates who believed language proficiency had less of an impact on learning and behavior (i.e. had scores lower than 10). Whether these differences are statistically significant or meaningful can only be determined with a larger N.

<table>
<thead>
<tr>
<th>Number of Research Based Practices</th>
<th>Up to 17</th>
<th>18 and higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-test sum below 10</td>
<td>3 (27.3% of total)</td>
<td>2 (18.2% of total)</td>
</tr>
<tr>
<td>Post-test sum 10 and above</td>
<td>2 (18.2% of total)</td>
<td>4 (36.4% of total)</td>
</tr>
</tbody>
</table>

3b. Teaching ELs during the Internship Experience and Core Teaching Practices

Approximately 46% of the graduates who had 5 or more ELs in their preservice internship classrooms used core teaching practices 18 or more times in their first year lessons. The number of ELs in the classrooms of the graduates during their internship might make a difference in the number of core teaching practices used in their lessons as first year teachers, but this kind of relationship can only be investigated using inferential tests requiring a larger N. With a larger N, it may also be important to consider which of the graduates completed bilingual extension programs to determine if there is a relationship between the application of core practices and the preparation of bilingual candidates, which differed in both coursework and internship profiles from the preparation of the non-bilingual candidates. All bilingual candidates learned to teach in classrooms with large numbers of ELs and were being mentored by experienced bilingual teachers.

<table>
<thead>
<tr>
<th>Number of Research Based Practices</th>
<th>17 or fewer</th>
<th>18 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ELs</td>
<td>1 (9.1% of total)</td>
<td>0</td>
</tr>
<tr>
<td>1-4</td>
<td>3 (27.3% of total)</td>
<td>1 (9.1% of total)</td>
</tr>
<tr>
<td>5 or more</td>
<td>1 (9.1% of total)</td>
<td>5 (45.5% of total)</td>
</tr>
</tbody>
</table>
3c. Grade Level and Core Teaching Practices

Data were analyzed to describe the frequency of core practices observed in candidates who were hired to teach in the early grades (PreK-Grade 2) and those in higher grades (grade 3-7). The data suggest that the graduates who were teaching in lower grades used core teaching practices with higher frequency than those teaching in the upper grades. However, a statistical difference can only be determined with a higher N.

<table>
<thead>
<tr>
<th>Number of Research Based Practices</th>
<th>17 or fewer</th>
<th>18 and more</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreK-Second Grade</td>
<td>3 (27.3% of total)</td>
<td>5 (45.5% of total)</td>
</tr>
<tr>
<td>Third to Seventh Grade</td>
<td>2 (18.2% of total)</td>
<td>1 (9.1% of total)</td>
</tr>
</tbody>
</table>

3d. Number of ELs in First Year Classrooms and CTPs

The researcher wanted to also determine whether the number of ELs in a classroom might be linked to the frequency of core teaching practices for ELs; however, the analysis revealed that there were equal percentages of graduates who used 17 or fewer practices (36.4%) and who used 18 or more practices (36.4%) in classrooms with 1-4 ELs and in classrooms where there were more than four ELs.

<table>
<thead>
<tr>
<th>Number of Research Based Practices</th>
<th>17 or fewer</th>
<th>18 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 ELs</td>
<td>4 (36.4% of total)</td>
<td>2 (18.2% of total)</td>
</tr>
<tr>
<td>5 or more ELs</td>
<td>1 (9.1% of total)</td>
<td>4 (36.4% of total)</td>
</tr>
</tbody>
</table>

In looking at the frequencies for the number of distinct categories of core teaching practices observed (the total possible number of distinct categories of practices were 11), there did not seem to be any discernable difference between the number of different practices used by those who had 4 or fewer ELs and those who had 5 or more ELs in their classrooms. All teachers used at least six practices and none used more than 10.

<table>
<thead>
<tr>
<th>Number of Distinct Research Based Practices</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 ELs</td>
<td>1 (9.1%)</td>
<td>2 (18.2%)</td>
<td>0</td>
<td>2 (18.2%)</td>
<td>1 (9.1%)</td>
</tr>
<tr>
<td>5 or more ELs</td>
<td>0</td>
<td>1 (9.1%)</td>
<td>1 (9.1%)</td>
<td>1 (9.1%)</td>
<td>2 (18.2%)</td>
</tr>
</tbody>
</table>
Discussion

The finding reported in the previous section offer some preliminary insights into how the Math Up program is preparing candidates to teach English learners and whether the Math Up Program candidates are effective teachers of ELs once they enter the classroom.

The Intended Curriculum: Emphasizing Preparation to Teach ELs

The Math Up program demonstrates a commitment to preparing all candidates for teaching ELs by: (1) requiring all candidates to complete specific coursework focused on teaching ELs, (2) providing field experiences and assignments focusing on ELs, (3) building knowledge of teaching ELs into internship documents for planning and reflection, and (4) offering all candidates and graduates webinars specifically focused on differentiating instruction for ELs.

Preparation for teaching ELs was “front loaded” in the form of two back to back courses in the summer prior to the beginning of the year-long internship. These courses were designed to provide candidates with a knowledge base for teaching ELs. The first course exposed all candidates to ELs by requiring the completion of a field based case study of an English learner or emergent bilingual learner. The second required candidates to use what they had learned from working with ELs/EBLs to plan for instruction using sheltered instructional strategies aligned with core practices identified in the literature on second language learning and teaching.

The exposure that candidates had to core teaching practices emphasized practices prominent in the sheltered instruction observation protocol (SIOP) such as planning for language instruction as part of content instruction, providing comprehensible input, and using culturally and linguistically responsive approaches to assess learning. Specific routines or methods recommended by second language researchers and experts that were not emphasized in the SIOP such as structuring protracted language events and using corrective feedback received less emphasis in coursework.

Despite the explicit attention to linguistic diversity in goals for half of the courses in the program, at the level of course topics, readings, and assignments, the number of specific references to linguistic diversity fell to 27% (N=3). The program handbook identified work with ELs as part of the program’s fieldwork, but only one course required fieldwork with ELs, and placement in an internship with ELs was only a requirement for those candidates seeking a bilingual extension. Although monthly inter-visitation to different classrooms would provide all candidates with opportunities to observe in classrooms with ELs, observations were guided by general performance indicators within Danielson’s Framework for Teaching, and thus could not guarantee that observers would be looking for core practices specifically designed for meeting the needs of ELs.

Evaluating How Candidates Experience Their Preparation

The evaluation of candidates’ preparedness to teach ELs can be found in artifacts of their learning from their coursework and fieldwork. There are two key assignments that all candidates include in their portfolios in the summer prior to beginning their internship to demonstrate their ability to teach ELs, a case study of an EL/EBL and a reflection describing connections between a set of sheltered lesson plans and knowledge of the EL/EBL in the case study. All participants in cohorts 2 and 3 received either a satisfactory or exemplary score for both of these
assignments, suggesting that they had developed knowledge and skills to both assess the linguistic needs of an EL/EBL and plan for instruction based on this knowledge.

Even though there were multiple ways that the intended curriculum focused candidate’s attention on the needs of ELs, the lack of a requirement that interns be placed in classrooms with ELs resulted in some candidates having limited opportunities to teach ELs during their preservice preparation. If the candidates seeking a bilingual extension and who are required to complete the internship in a classroom of bilingual children are removed from the total number of candidates in Cohorts 2 and 3, then of the 17 candidates preparing to teach in English medium classrooms, close to a third (29.4%) were not exposed to ELs in their internship classrooms. One of the questions the finding raises is whether this difference matters in terms of core teaching practices. That is, do these differences in how preparation was experienced correlate to the kinds or frequency of practices produced during the preservice experience and the kinds of practices observed in the first years of teaching? The analyses of data regarding the potential impact of the number of ELs in the internship on teaching practices during the preservice program may become apparent once the preservice artifacts, i.e., portfolios and supervisors’ evidence collection records, of all Cohort 2 and Cohort 3 candidates are analyzed. The analysis of the relationship between the number of ELs in the internship and teaching practices observed in the first year lessons is based on a limited amount of data, but is a worthy question to pursue as the data base grows.

The case study of a candidate’s use of core practices in planning and instruction during the preservice experience revealed some interesting preliminary insights. All core practices under investigation were found in her lesson plans, reflections, videos of teaching, or in the observation notes of supervisors; however, some practices were more evident than others in the preservice artifacts. There are two possible explanations for this. One is that evidence of actual instruction is noticeably less prevalent in the portfolios than evidence of planning for instruction, and some practices such as verbal scaffolding are only evident in the less prevalent form of evidence such as videos. A second explanation is that while preparation for all of the core practices is evident in the intended curriculum, some approaches to implementing a particular core practice in the classroom became part of the candidate’s teaching repertoire while others did not. For example, the kinds of evidence found in portfolio artifacts for promoting student-to-student interaction suggest that the candidate understood the importance of providing opportunities for student-to-student interaction through small group activities because she repeatedly incorporated this practice in her planning; however, there was no evidence of her teaching or planning to teach more proficient learners how to assist ELs during group activities, which research suggests is important to optimizing interactions between ELs and more proficient English speakers in group interactions.

Evidence of Core Teaching Practices in First Year Lessons

All but one of the core practices under investigation were evident in the teaching of the first year teachers, particularly providing comprehensible input, exposing all children regardless of language proficiency level to grade level content and academic vocabulary, and verbal scaffolding. In the case study example, there is evidence that certain practices, verbal scaffolding in this case, are prominent in the first year lesson even though they might not have occurred with great frequency in preservice artifacts. This raises the question about the challenge of using frequencies to ascertain emphasis when using different kinds of data. This methodological
challenge will be addressed in the next stage of the research by using a software that allows for a multilayered coding system and can provide multidimensional analyses of classroom activities that encompass multiple, overlapping practices.

The findings also reveal that some methods or routines recommended in the literature are missing from the practices observed in these classrooms. These approaches included: (1) opportunities in the English medium classrooms for children to use all of their language knowledge including what they know in their native language, (2) the use of corrective feedback by the teacher, and (3) attention to guiding English proficient students in how they can assist their non-English speaking peers in grouping. It also appeared that teachers emphasized learning academic vocabulary as important, but attention to the syntactic and discourse challenges of academic language seemed to have been rarely attended to in any explicit way, which raises a question as to whether this was adequately addressed in coursework and how these particular practices can be better integrated into teacher preparation. Perhaps some practices commonly identified as good teaching in general differ in important ways from best practices for ELs. The question is whether the choice of core practices employed by program graduates impact their ability to ensure ELs’ success rates tests of language proficiency or academic learning.

**Influence of Personal and Contextual Factors on Teaching Practices**

The investigation included an analysis of possible relationships between factors that might be related to the number of core teaching practices observed in the first year lessons. It does not appear that candidates’ attitudes regarding the influence of language proficiency on student learning and behavior either change from the beginning to the end of the program, or significantly influence the number of core teaching practices observed in the first year of teaching. This finding will be further investigated as data on Cohorts 3 and 4 are added to the investigation.

What might affect the number of course teaching practices may be grade level. More core teaching practices were found in PreK-Grade 2 classrooms than in classrooms in grades three or higher suggesting that as the N becomes larger in future data collection, a significant difference might emerge. This finding is important and alarming given that the academic language and content demands of upper grades are greater than in the early grades. ELs in upper grades need more support, not less, to comprehend and communicate more complex levels of academic content and language. In the next stage of research, a content analysis needs to be undertaken of differences in practices at the two levels to inform recommendations about how to maximize the application of best practices in the upper grades.

**Future Directions for Research**

Below are questions that will guide the next stage of this longitudinal study. The timeline for the complete investigation is provided in Appendix E.

**Focus Questions for Math Up Cohorts for Year Two Investigation**

1. As preservice artifacts for all Math Up Cohort 2, 3 and 4 candidates and Traditional Program Cohorts 1 and 2, classroom observations from Years 1 and 2 for three of these cohorts (2 Math and 1 Traditional) are added to the data base, and student NYESLAT data for Cohort 2, an investigation will be undertaken to determine
whether there is a statistically significant relationship between the number and range of applications of core practices in preservice experiences, and the number and range of best practices observed in their first two years of teaching.

2. The first stage of the research did not include an investigation of potential differences between those candidates preparing for English medium classrooms and those preparing for bilingual classrooms due to small numbers. There are differences in both the coursework and the internship for these two groups of graduates. Will there be a significant difference between the attitudes of these two groups of candidates? Will there be a difference in their application of core teaching practices during their preservice experience? During their first year of teaching? In the next stage of the research, data for bilingual and English medium candidates will be compared to begin to answer these questions. The number of bilingual extension candidates will increase as data for all cohorts is incorporated into the data set, thus allowing for these comparisons to be made.

3. In the next phase of the investigation, the researcher will seek ways to resolve the problem of how to determine what constitutes frequent use of a core practice given that lessons in the first years of teaching vary in length and that preservice artifacts tend to incorporate more evidence of some practices than of others because of the nature of the assignments. One possible approach to this analysis will be to identify a set of artifacts that are categorized as primary data sources and a set which include secondary sources, and then compare the two sets across candidates to gain a better understanding of what the frequency numbers mean across artifacts. As noted in the discussion section, additional software will be used to document overlapping practices.

4. The preliminary findings suggest that there are some nuanced differences in how candidates are implementing particular core practices. In the first stage of the investigation, core practices were divided into 11 separate categories. However, there are important connections between some of these categories and so the core practices are being re-organized in the second year for purposes of analysis. Appendix F offers an overview of how the 11 separate categories have been collapsed into 5 core teaching practices, each with a set of descriptors. In year two, analysis of core teaching practices will be conducted at three levels: at the level of core teaching practices, at the level of particular routines or approaches characteristic of the core practice and as the level of descriptors of the routines and approaches characteristic of core practices. Qualitative data analysis software (ATLAS.ti) will be used to analyze these multiple layers of practice.

5. The researcher will continue to examine whether there are differences in the kinds and frequency of use of core teaching practices between lower and upper grade classrooms of program graduates.

6. In summer 2015, annual NYSESLAT data for the students of Cohort 2 graduates will become available and the investigation will include an analysis of how Cohort 2 graduates compare to other beginning teachers in the public school system in terms of
the levels of academic language proficiency reached by their ELs. Preliminary data received for Cohort 1 graduates, who were not included in this study, will provide a baseline. A preliminary analysis of their NYSESLAT data suggest that ELs in the classrooms of Math Up graduates will perform better than ELs in classrooms of other beginning teachers in New York City public schools.

Collection of Additional Math Up Participant Data

In 2014-2015, the complete data set for Cohort 3 will be analyzed. Cohort 2 graduates will be observed for a second time. Cohort 3 graduates will be observed in their classrooms in the first half of 2015. The portfolios of all candidates who were hired to teach and agree to participate in the study will be reviewed and this data set will be used to collect data on the set of hypothesis listed in the previous section.

Collection of Comparative Data with Candidates in Traditional Program

In the next stage of research data collection will begin on a cohort of traditional preservice program candidates. This data will eventually provide a basis for comparison between teachers who completed the Math Up program and candidates who complete a traditional teacher preparation program in Childhood Education. To answer Research Questions 3 (How does Math Up preparation compare to the preparation that candidates receive in a traditional program?) and 4 (How does the effectiveness of the Math Up preparation compare to the preparation of candidates who completed a traditional graduate program?), comparative data are being collected from a cohort of traditional graduate teacher education candidates completing the traditional 42 credit MSED program leading to NYS Initial Certification in Childhood Education. Note that the MSED preservice program takes two years to complete and not all graduates may be hired into a teaching position immediately following graduation. Data collection began in August 2014.

The research procedures will include: (1) collecting course outlines form preservice program and analyzing after all courses have been completed; (2) administering a pre-program attitudes questionnaire upon entry into the preservice program; (3) administering a post program attitudes questionnaire at the end of the last semester in the preservice program; (4) reviewing participants’ program portfolio work and student teaching evaluations following participants’ completion of the preservice program; (5) collecting information on the number of ELLs in candidates’s student teaching or internship settings; and (6) observing teaching practice once during the first year of teaching and once during the second year of teaching.

Potential Impact of Changing Policies on the Longitudinal Investigation

Given the longitudinal nature of the investigation being conducted of Math Up and traditional program graduates, the study of effective practices could reflect the impact of the new policy changes, and so future investigations will take into account potential differences among Cohorts that occur over time.

Recent and proposed changes to the policies guiding the education of English learners and the preparation of teachers in New York State reflects a growing commitment to ensuring that all teachers are prepared to meet the needs of English learners. Beginning in May 2014, all
teachers are required to pass the Educating All Students exam (New York State, 2012) to receive an initial teaching certification. Fifty-four percent of the exam measures candidate knowledge of diverse populations and English language learners. A second new requirement for teaching certification is the edTPA (Stanford Center for Assessment, Learning, and Equity, undated), which is a performance-based assessment of a candidate’s readiness to teach. The edTPA places a strong emphasis on the ability of a candidate to effectively support all learners in meeting the language demands for academic content learning including vocabulary, syntax, discourse, and language functions.

In addition to changes in teacher education policy, New York State policies guiding the education of ELs (Part 154) are being revised under the “Blueprint for English Language Learners (ELLs) Success,” a statewide framework aimed to clarify expectations for administrators, policymakers, and practitioners to prepare ELLs for academic success (New York State Education Department Office of Bilingual Education and Foreign Language Studies, April 2014). To meet the principles established in the Blueprint, specific state wide initiatives such as the New York State Bilingual Common Core Initiative have been funded to support teachers in helping ELs meet Common Core State Standards. This initiative has been charged with developing new and home language progressions for ELs aligned with the Common Core State Standards from PreK through Grade 12. Additionally, the proposed state policy regarding the identification, servicing, and evaluation of ELs is being revised within the next few months. One outcome will be mandatory training as part of the professional development hours for all teachers (15% of the total hours for English medium teachers and 50% of the professional development for ESL and bilingual teachers).

Finally, at the local level, there is a New York City Department of Education initiative that has been disseminated to building leaders entitled “Specific Considerations for Teaching English Language Learners” (March 2014) that provides a set of questions for each of the domains within the Danielson’s Framework for Teaching (2007) to guide teachers and school leaders in describing effective teaching for ELs. Given that the recent teacher contract in New York City schools includes gathering evidence on elements from three of the Danielson domains to evaluate teacher effectiveness, the work focusing on teaching ELs could potentially begin to impact the teacher evaluation process and thus impact instruction.
Acknowledgements

This research is funded through a grant awarded to the School of Education at Lehman College, CUNY from the federal Teacher Quality Partnership Grants Program Recovery Act. The funded project is Mathematics Achievement with Teachers of High-need Urban Populations (MATH-UP).

The researcher would like to acknowledge the important contributions made by Kathleen Camacho, who served as a research assistant on this project. Kathleen served as a statistician and also provided invaluable support in collecting important research that was used for the literature review, preparing the data on the intended curriculum, and interviewing course instructors.
References


Council of Chief State School Officers and the English Language Proficiency Development Framework Committee, Council of Great City Schools, the Understanding Language Initiative at Stanford University, and World-Class Instructional Design and Assessment-


Appendix A. Math Up Background & Attitude Questionnaire (Cohort 4 Sample)
Developed by Research for Better Schools (RBS)

1. What is your name?

2. What is your race/ethnicity? (Please check all that apply.)
   - American Indian or Alaska Native
   - Black or African American
   - Hispanic or Latino
   - Asian or Native Hawaiian/Other Pacific Isl.
   - White

3. What is your sex?
   - Female
   - Male

4. How old are you?
   - 22–29
   - 30–35
   - 36–40
   - 41–45
   - 46–50
   - 51–60
   - 60+

5. Please indicate the types, locations, and sizes of schools you attended as a child by checking the appropriate boxes below.

6. Did you attend New York City public schools as a child?
   - No
   - Yes, for 1 or 2 years
   - Yes, for 3 to 5 years
   - Yes, for 6 or more years

7. What is the first language you learned as a child?

8. Do you speak and understand speech of any language other than English?
   - No
   - Yes

   If yes, please list all other languages:

9. Do you read and write in any language other than English?
   - No
   - Yes

   If yes, please list all other languages:

10. Were you placed in a bilingual setting as an elementary or secondary school student?

   ☐ Yes
   ☐ No

   10.1 If yes, for how many years were you in a bilingual setting? _____

11. What was your major as an undergraduate?

12. What was your minor (if any) as an undergraduate?

13. Have you ever worked with elementary school-aged children (e.g., as a tutor, camp counselor, daycare staffer, paraprofessional, etc.)?

   - No
   - Yes

   13a. If yes, please describe your experience:

14. Do you plan to seek licensure in bilingual or special education? (Please check all that apply.)
   - Bilingual education
   - Special education

15. How did you hear about the MATH-UP project?
16. Why did you decide to participate in the MATH-UP project?

17. What do you most hope to learn during your participation in the MATH-UP project?
For questions 18 through 24, please circle the number on the response scale that most accurately describes your belief.
To what extent do you believe that a student’s performance in mathematics is dependent upon the following?

18. A student’s cognitive competence?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

19. Whether that student is proficient in English?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

20. A student’s eligibility for special education services (IEPs) because of one or more disabilities such as those listed at the bottom of page 4?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

21. A student’s attitude toward mathematics?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

22. A student’s motivation?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

23. A student’s prior preparation in math?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

24. The quality of math instruction that student receives?
   1 2 3 4 5 6 7 8
   not at all dependent  completely dependent

For questions 25 through 34, please circle the number on the response scale that most accurately describes how strongly you agree or disagree with the following statements.

25. Truly understanding mathematics in the math classroom requires special abilities that only some people possess.
   1 2 3 4 5 6 7 8
   strongly disagree  strongly agree

26. Truly understanding mathematics in the math classroom requires special abilities that children with disabilities such as those listed at the bottom of page 4 do not possess.
   1 2 3 4 5 6 7 8
   strongly disagree  strongly agree

27. Truly understanding mathematics in the math classroom requires special abilities that children who are not proficient in English do not possess.
   1 2 3 4 5 6 7 8
   strongly disagree  strongly agree

28. General education teachers who have children with disabilities such as those listed at the bottom of page 4 in their classrooms cannot be as effective at teaching math as general education teachers who do not have children with disabilities in their classrooms.
   1 2 3 4 5 6 7 8
   strongly disagree  strongly agree

29. General education teachers who have children who are not proficient in English in their classrooms cannot be as effective at teaching math as teachers who do not have English language learners in their classrooms.
   1 2 3 4 5 6 7 8
30. Students with disabilities such as those listed at the bottom of page 4 cause most behavioral problems that occur during **math** instruction.

1 2 3 4 5 6 7 8

31. Students with disabilities such as those listed at the bottom of page 4 cause most behavioral problems that occur during **literacy** instruction.

1 2 3 4 5 6 7 8

32. **Children who are not proficient in English** cause most behavioral problems that occur during **literacy** instruction.

1 2 3 4 5 6 7 8

33. **Children who are not proficient in English** cause most behavioral problems that occur during **math** instruction.

1 2 3 4 5 6 7 8

34. **Effective teaching strategies for children with disabilities are usually effective strategies for teaching children who speak a language other than English.**

1 2 3 4 5 6 7 8

**Disabilities referred to in questions 20, 26, 28, 30, and 31**

- Difficulty maintaining attention for the class period
- Difficulty attending to tasks
- Difficulty keeping place on a page in the text or workbook
- Difficulty using a number line
- Difficulty correctly identifying symbols or numerals
- Difficulty recalling math facts
- Difficulty with following a sequence of steps to solution
- Difficulty with oral communication
- Difficulty interpreting pictures and diagrams
- Difficulty with written communication
- Difficulty following oral directions that have multiple steps
- Difficulty remembering given information
- Difficulty comprehending what s/he is reading
- Difficulty decoding what s/he is reading
- Requiring extra time to respond to a teacher’s questions or directions
Appendix B. Traditional Program Background and Attitude Survey adopted from RBS Survey for Math Up Candidates

1. What is your name? ____________________________________________________________

2. How old are you?
   □ 22–29   □ 30–35   □ 36–40   □ 41–45   □ 46–50   □ 51–60   □ 60+

3. Did you attend New York City public schools as a child?
   □ No   □ Yes, for 1 or 2 years   □ Yes, for 3 to 5 years   □ Yes, for 6 or more years

4. What is the first language you learned as a child? __________________________________

5. Do you speak and understand speech of any language other than English?  □ No   □ Yes
   If yes, please list all other languages: __________________________________________

6. Do you read and write in any language other than English?  □ No   □ Yes
   If yes, please list all other languages: __________________________________________

7. Were you placed in a bilingual setting as an elementary or secondary school student?
   □ Yes   □ No
   If yes, for how many years were you in a bilingual setting? ___
   If no, were you placed in an ESL class?  □ Yes   □ No
   If yes, what type of ESL class was it?
   □ ESL pull-out   □ ESL push-in   □ Self-contained ESL class

8. Do you plan to seek licensure in bilingual or special education? (Please check all that apply.)
   □ Bilingual education
   □ Special education
For questions 9 through 15, please circle the number on the response scale that most accurately describes your belief.

To what extent do you believe that a student’s performance in mathematics is dependent upon the following?

9. A student’s cognitive competence?
   1  2  3  4  5  6  7  8
   not at all dependent ................................................................. completely dependent

10. Whether that student is proficient in English?
    1  2  3  4  5  6  7  8
    not at all dependent ................................................................. completely dependent

11. A student’s eligibility for special education services (IEPs) because of one or more disabilities?
    1  2  3  4  5  6  7  8
    not at all dependent ................................................................. completely dependent

12. A student’s attitude toward learning?
    1  2  3  4  5  6  7  8
    not at all dependent ................................................................. completely dependent

13. A student’s motivation?
    1  2  3  4  5  6  7  8
    not at all dependent ................................................................. completely dependent

14. A student’s prior preparation in a content area (e.g., math, social studies, science, language arts)?
    1  2  3  4  5  6  7  8
    not at all dependent ................................................................. completely dependent

15. The quality of instruction that student receives?
    1  2  3  4  5  6  7  8
    not at all dependent ................................................................. completely dependent
For questions 16 through 21, please circle the number on the response scale that most accurately describes how strongly you agree or disagree with the following statements.

16. Reading requires special abilities that children who are not proficient in English do not possess.

1 2 3 4 5 6 7 8

strongly disagree

strongly agree

17. Truly understanding mathematics requires special abilities that only some people possess.

1 2 3 4 5 6 7 8

strongly disagree

strongly agree

18. Understanding mathematics requires special abilities that children who are not proficient in English do not possess.

1 2 3 4 5 6 7 8

strongly disagree

strongly agree

19. General education teachers who have children who are not proficient in English in their classrooms cannot be as effective as teachers who do not have English language learners in their classrooms.

1 2 3 4 5 6 7 8

strongly disagree

strongly agree

20. Children who are not proficient in English cause most behavioral problems during instruction.

1 2 3 4 5 6 7 8

strongly disagree

strongly agree

21. The same teaching strategies that are effective for children in general are also effective strategies for teaching children who speak a language other than English.

1 2 3 4 5 6 7 8

strongly disagree

strongly agree
## Appendix C. Math Up Data Sources for Cohort 2
### DATA SOURCES FOR ANALYZING EXPERIENCED CURRICULUM & PROGRAM IMPACT

**PRESERVICE QUALITATIVE DATA:**
1. DRF Portfolio Contents

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<thead>
<tr>
<th>DATA SOURCE/KEY ASSESSMENT</th>
<th>COURSE or Context &amp; Date</th>
</tr>
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<tbody>
<tr>
<td><strong>COHORT 2 ELECTRONIC PORTFOLIO ARTIFACTS</strong></td>
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<tr>
<td>Teaching Philosophy 1</td>
<td>Beginning of Program</td>
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<td>Teaching Philosophy 2</td>
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<td>EBL/ELL Study</td>
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<td>Reflection Linking SIOP Lesson Planning to ELL/ EBL Study</td>
<td>EDE 727 Summer 1</td>
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<tr>
<td>Student Observation and IEP Project (Final Reflection, Measurable Goals, PLOP)</td>
<td>EDS 707 Fall 1</td>
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<td>Final Essay (Includes evaluation of ability to explain the importance of evidence and its effect on increasing one’s pedagogical knowledge and teaching abilities.)</td>
<td>EDE 621 Fall 1</td>
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<td>Instructional Unit</td>
<td>EDE 717 Fall 1</td>
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<td>Lesson Plan &amp; Reflection</td>
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<td>(Monolingual) Final Essay</td>
<td>EDE 713 Spring 2 (monolingual)</td>
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<td>Assignment not accessible</td>
<td>EDE 714 Spring 2 (monolingual)</td>
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<td>(Bilingual) Social Studies Lesson</td>
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<td>First Observation Post-conference Notes</td>
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## COHORT 2 ELECTRONIC PORTFOLIO ARTIFACTS

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<td>(Note: Second Observation pre &amp; post conference notes are found under Video section below.)</td>
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<td>Danielson ITP Check List February</td>
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<td>Danielson ITP Check List May</td>
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### 2. SUPERVISOR NOTES FROM OBSERVATIONS

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<td>Supervisor Notes from Third Formal Supervisor Observation</td>
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### 3. PRESERVICE QUANTITATIVE DATA

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<tr>
<td>Attitudes Post Program Questionnaire</td>
<td>Final summer semester</td>
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Professionalism course

| Classroom Survey for Cohort 2 (profiles number of ELS in internship classrooms, grade level, bilingual or English medium program setting) | RBS—(Cohort 2: Summer 2013; Cohort 3: Summer 2014) |

4. INSERVICE/FIRST 2 YEARS OF TEACHING

Qualitative Data

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Quantitative Data from NYCDOE on Student Learning

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Other (For purposes of triangulation)

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<th>Data Source</th>
<th>Context-Date</th>
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<tbody>
<tr>
<td>Notes &amp; MEMBER CHECK from Field Consultants Regarding Teaching Practices &amp; Interviews by Research Assistant</td>
<td>Years 1 &amp; 2 of Teaching</td>
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## Appendix D. EFFECTIVE PRACTICES FOR ELLs/EBLs INSTRUMENT FOR ANALYZING OBSERVATIONS

<table>
<thead>
<tr>
<th>Date:</th>
<th>Start time:</th>
<th>End Time:</th>
<th>TEACHER NO</th>
</tr>
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### Classroom Type:
- ___Mainstream English-medium ___Bilingual ___Sheltered ___ESL/ELD Grade(s)

### Number of Adults Number of Children Number of EBLs/ELLs Content Focus

### ADDITIONAL INFORMATION:

<table>
<thead>
<tr>
<th>PRACTICE</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Grade/age appropriate content standards | - grade level core curriculum  
- resources aligned with standards  
- Content objectives defined and shared with children |
| Language demands relevant to content | - Academic language and language functions emphasis  
- Language objectives defined and shared  
- Repeated exposure to key language structures  
- Alignment with NYS standards for home & new languages |
| Oral language development emphasis to support reading/writing development | - Early, ongoing and intensive emphasis on oral language development as preparation for reading and writing  
- Explicit connections made between oral language and reading and writing |
| Comprehensible input | - Modeling of skills, procedures, & strategies  
- Guided Practice  
- Amplify new content using visuals, etc.  
- Text selection & adaptation for varying levels of proficiency |
| Building on background knowledge | - New learning connected to prior knowledge  
- New learning connected to previous learning |
| Using primary/home language(s) | - Display and use of different languages  
- Strategic use of home language  
- Acceptance of code-switching and translanguaging  
- In bilingual class, instruction in home language |
| Scaffolding classroom discussion | - Guided interactions/interactional scaffolding  
- Expanded dialogues  
- Use of wait time |
<table>
<thead>
<tr>
<th>PRACTICE</th>
<th>Examples</th>
</tr>
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<tbody>
<tr>
<td><strong>Meaningful practice opportunities</strong></td>
<td></td>
</tr>
<tr>
<td>• Integration of language practice and content practice</td>
<td></td>
</tr>
<tr>
<td>• Tasks requiring multiple language skills</td>
<td></td>
</tr>
<tr>
<td>• Designed for different proficiency levels</td>
<td></td>
</tr>
<tr>
<td>• First hand &amp; hands on activities</td>
<td></td>
</tr>
<tr>
<td><strong>Grouping &amp; student-student interactions</strong></td>
<td></td>
</tr>
<tr>
<td>• Frequent opportunities for student/student interaction</td>
<td></td>
</tr>
<tr>
<td>• Grouping configurations supporting language and content learning</td>
<td></td>
</tr>
<tr>
<td>• “social solidarity” between ELLs/EBLs &amp; non-ELLs</td>
<td></td>
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<tr>
<td><strong>Formal &amp; informal assessment to analyze learning and to provide feedback</strong></td>
<td></td>
</tr>
<tr>
<td>• Regular checks for comprehension that are structured for differing levels of language production</td>
<td></td>
</tr>
<tr>
<td>• Feedback reflects developmental nature of language learning for individual ELLs</td>
<td></td>
</tr>
<tr>
<td>In EDL/ESL classroom</td>
<td></td>
</tr>
<tr>
<td>• Corrective feedback</td>
<td></td>
</tr>
<tr>
<td>In bilingual classroom</td>
<td></td>
</tr>
<tr>
<td>• Assessments allow for demonstration of knowledge in home language</td>
<td></td>
</tr>
<tr>
<td><strong>Culturally responsive pedagogy</strong></td>
<td></td>
</tr>
<tr>
<td>• Cultural inclusiveness emphasis</td>
<td></td>
</tr>
<tr>
<td>• Study incorporates student cultural histories</td>
<td></td>
</tr>
<tr>
<td>• Incorporates Home &amp; Community Funds of Knowledge</td>
<td></td>
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</tbody>
</table>
Appendix E. TIME LINE OF DATE COLLECTION

**Fall 2012**  
Collect Copies of Course Outlines

**Spring 2013**  
Preliminary Review of Candidate Portfolios & Rubrics form first observations  
Preliminary Review of Baseline Questionnaires completed upon entrance to the program  
Collect Copies of Course Outlines for Cohorts 2 & 3  
Course Outline Follow up interview of Fall Methods Instructors for Cohort 2

**Summer 2013 (Final Session of Preservice Program for Cohort 2)**  
Collect Copies of Course Outlines  
Data Collection on Cohort 3 begins.

**Fall 2013**  
Data collection on Cohort 2 first year teachers.  
Data analysis of Cohort 2 preservice experience.  
Data collection for Cohort 3.

**Spring 2014**  
Data collection on Cohort 2 first year teachers.  
Data analysis of Cohort 2 preservice experience.  
Data collection for Cohort 3.  
Prepare IRB to collect data on the Graduate Childhood Program.

**Summer 2014 (Final Session of Preservice Program for Cohort 3)**  
Collect Copies of Course Outlines  
Post Survey  
Data collected on Classroom Context (Number of ELs, for example).

**Fall 2014 & Spring 2015**  
Data collection for first year teachers (cohort 3 and any first year teachers from cohort 2).  
Data collection for second year teachers (cohort 2)  
Preservice Data analysis for Cohort 3.  
Preservice Data collection for Cohort 4.  
Preservice Data collection for Traditional Program cohort—Pre-program survey

**Fall 2015-Spring 2016**  
Data collection for first year teachers (cohort 4 and any first year teachers from cohort 3).  
Data collection for second year teachers (from cohorts 3 and possibly from cohort 2)  
Preservice Data collection for Traditional Program cohort.

**Fall 2016-Spring 2017**  
Data collection for first year teachers from traditional program  
Data collection for second year teachers (from cohorts 2-4)

**Fall 2017-Spring 2018**  
Data collection for second year teachers from traditional program and cohorts 2-4 if in second year of teaching.
Appendix F. CORE PRACTICES FOR ELs CODING

1. Engaging English Learners with Academic Language

Language demands relevant to content
- Language objectives defined and shared with learners
- Repeated exposure to key language vocabulary, syntax & language conventions
- Repeated exposure to language functions aligned with selected academic tasks
- Frontloading of grammar, vocabulary, and language functions related to concepts, activities & assignments

2. Using Learner Resources to Support New Learning

Building on Background Knowledge
- New learning connected to previous learning
- New learning builds on prior knowledge

Capitalizing on ELs’ Full Linguistic Repertoire
- Multilingual classroom displays and books
- Strategic use of home and new languages such as cognate instruction or phonics instruction
- Use code-switching and translanguaging to investigate language differences/similarities
- Supporting children’s use of translanguaging when producing language, e.g., when writing
- In bilingual classroom, teaching in learners’ native language

Using Funds of Knowledge that ELs Bring to Their Learning
- Cultural inclusiveness emphasis
- Instruction incorporates learners’ cultural histories through home/community projects
- Framing classroom discussions around “culture bound” topics placing ELs as experts

3. Providing Comprehensible Input to ELs

- Modeling of skills, procedures, & strategies
- Amplify (rather than reduce) new content using visuals & various forms of multimedia
- Verbal Scaffolding using gestures & body language in spoken discourse
- Adjusting the rate and complexity of speech
- Text selection & adaptation for varying levels of proficiency
4. **Promoting Oral Language Development**

Oral language development emphasis to support reading/writing development
- *Early, ongoing and intensive emphasis on oral language development as preparation for reading and writing*
- *Explicit connections made between oral language and reading and writing*

Scaffolding Class Discussions
- *Guided interactions/interactional scaffolding*
- *Protracted language events, e.g., instructional conversations*
- *Use of added wait time for ELs*
- *Use of corrective feedback*
  - Teacher provides, corrective feedback
  - In bilingual classroom

Meaningful Practice Opportunities
- *Integration of language practice and content practice*
- *Tasks requiring multiple language skills*
- *Supports different proficiency levels by including guided practice, hands on activities, or supports like sentence frames*
- *First hand & hands on activities*

Promoting Student to Student Interactions
- *Frequent opportunities for student/student interaction*
- *Grouping configurations supporting language and content learning*
- *Teaching learners how to support each other and in particularly ELs in groups*

5. **Using Culturally and Linguistically Responsive Formal and Informal Assessment to Analyze Learning**

Formal & informal assessment to analyze learning
- *Frequent checks for understanding*
- *Scaffold assessments for differing levels of language production (reducing language demands for lower levels by providing sentence frames or allowing for visual forms of demonstrating knowledge)*
- *assessments allow for demonstration of knowledge in home language either through teacher or students sharing the same home language*
Table 1. Within Case Display for Course Content Relevant to Linguistic Diversity

<table>
<thead>
<tr>
<th>Artifact (ling-gray row) (diversity only-white row)</th>
<th>Course Description</th>
<th>Goals/Outcomes/Themes</th>
<th>Session Topics/Class Discussions</th>
<th>Readings</th>
<th>Fieldwork/Clinical Experience</th>
<th>Assignments/Evaluation of Assignments</th>
<th>MISC</th>
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<td>Artifact (ling-gray row) (diversity only-white row)</td>
<td>Course Description</td>
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<td>Session Topics/Class Discussions</td>
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<td>Fieldwork/Clinical Experience</td>
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Table 2. Practices Identified in Program Artifacts for Case P8793

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<th>ARTIFACT</th>
<th>GAC (YES/NO)</th>
<th>LDRC (YES/NO)</th>
<th>OLSK #</th>
<th>CI #</th>
<th>BBK #</th>
<th>P/HL #</th>
<th>SCD #</th>
<th>MPO #</th>
<th>GSSI #</th>
<th>F&amp;IA #</th>
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<td>EDE 758 Domain 3 Commentary 2 in preparation for Third Formal Observation</td>
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<td>Supervisor Evidence Collection Records</td>
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</table>

| PRACTICE TOTALS FROM PRESERVICE ARTIFACTS                                |               |               | 5      | 33   | 10    | 27     | 6     | 9     | 17    | 20    | 1     |
| TOTALS FOR FIRST YEAR OF TEACHING/OBSERVATION OF ONE LESSON             | Yes           | Yes           | 2      | 2    | 1     | 1      | 4+    | 3     | 1     | 2     | 0     |
## Table 3. Practices Observed in First Year Observations
(Total Number of Lessons Observed=11)

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<th>PRACTICE</th>
<th>Number of Applications</th>
<th>Number of Teachers Using Practice</th>
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<td>Grade/age appropriate content standards</td>
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<tr>
<td>Language demands relevant to content</td>
<td>11</td>
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<tr>
<td>Oral language development emphasis to support reading/writing development</td>
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<tr>
<td>Comprehensible input</td>
<td>30</td>
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<tr>
<td>Building on background knowledge</td>
<td>12</td>
<td>10</td>
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<tr>
<td>Using primary/home language(s)</td>
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<td>4</td>
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<tr>
<td>Scaffolding classroom discussion</td>
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<td>Meaningful practice opportunities</td>
<td>16</td>
<td>10</td>
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<td>Grouping &amp; student-student interactions</td>
<td>13</td>
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<tr>
<td>Formal &amp; informal assessment to analyze learning and to provide feedback</td>
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<td>11</td>
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<tr>
<td>Culturally responsive pedagogy</td>
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